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**THE OXFORD SURVEY
OF THE BRITISH EMPIRE
VOLUME I**

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THE OXFORD SURVEY OF THE BRITISH EMPIRE

THE BRITISH ISLES AND MEDITERRANEAN POSSESSIONS (GIBRALTAR, MALTA, CYPRUS)

With 52 Photographs, 7 Coloured Maps, and 63 Figures in text

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PRÉFACE

THE object of this series is to furnish a survey of the British Empire and its constituent parts in their geographical and allied aspects, together with their economic, administrative, and social conditions, at the present time. History has not been included as an integral part of the scheme, except for the inclusion of a general historical summary in the General Volume; for the rest, historical references have been included only in so far as they were found desirable for the explanation of existing conditions. The history of the Empire has been brought under review elsewhere, notably in the Oxford *Historical Geography*, edited by Sir Charles Lucas.

The series is in six volumes, and the subject-matter is thus distributed :

- I. The British Isles and Mediterranean territories (Gibraltar, Malta, Cyprus).
- II. Asiatic territories.
- III. African territories (with adjacent islands, Mauritius, &c., St. Helena, Ascension, and Tristan da Cunha).
- IV. American territories (with the Falkland Islands and dependencies).
- V. Australasian territories (including islands in the Pacific Ocean and the British sector in Antarctica).
- VI. General.

The Editors have been in close consultation throughout as to the general plan and details of the work. They have shared between them the arrangements with the contributors, for whose collaboration they express their thanks. Professor Herbertson has undertaken the major part of the work connected with the maps; Mr. Howarth has carried out the greater part of the editorial work in its later stages, has dealt with the illustrations (in the five topographical volumes), and has seen the volumes through the press.

It is desired to acknowledge Mrs. Howarth's collaboration in the work of indexing, and Mr. O. Brilliant's assistance in the compilation of the gazetteer references in the topographical volumes.

Notes in the text enclosed in square brackets are editorial.

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BRITISH ISLES - GEOLOGICAL.



THE BRITISH ISLES

CHAPTER I

PHYSICAL FEATURES AND GEOLOGY

BY PROFESSOR GRENVILLE A. J. COLE

General Structural Features

THE British Isles are essentially a part of the continent Position. of Europe, of which they form the western outpost. The deep water of the Atlantic lies close against the shores of Portugal and the Bay of Biscay; but the line of 100 fathoms curves outward beyond Ireland, and includes St. Kilda and the Shetland Isles on what is known as the 'continental shelf'. This line is commonly selected as the continental margin, since it is readily followed upon maps. The steeper descent to the Atlantic basin begins, however, at about 300 fathoms (550 metres¹), and the shelf is seen, if we trace out this line, to include the Porcupine Bank, at a distance of 150 miles from the west Irish coast.

The Faeroe Islands, on the other hand, are isolated by deeper water, and Rockall Bank in long. 29° W. is more clearly connected with Greenland than with Europe. The continental shelf does not represent the upheaval of the level floor of the Atlantic; its margin marks the spread of the ocean eastward, through the foundering of ancient land. The rocks dredged from the Porcupine Bank, which rises to within 84 fathoms of the surface, suggest that it is a drowned igneous island, surrounded by sea-beaches, and comparable with the volcanic centres of the Inner Hebrides.

Down to the close of Mesozoic times, a large land area stretched north-westward in the Atlantic region, and the shore-line of the Cretaceous sea lay somewhere across the south of Scotland and the crumpled rocks of Donegal. Continental connexion in geological history.

¹ [Metrical equivalents quoted are approximate only.]

This sea covered a large part of the British area. As the north-west continent sank and as the Atlantic grew, the new continent of Europe rose to the east, and caught into itself a portion of the earlier land. The mountainous ridges of the Scottish and Irish highlands have been thus preserved, and even the continental shelf appears to have lain above sea-level in recent geological times. A large part of the area now occupied by shallow water was probably then covered by rolling downs of Cretaceous chalk. The latest movement of depression is marked by submerged peat and forests round the coasts of the British Isles. The insular nature of Britain, which has so profoundly affected the outlook of its inhabitants and the development of an empire overseas, is due to what may be called an accident of the continental edge. Ireland is separated from Great Britain by a shallow sea, rarely exceeding 50 fathoms (90 metres) in depth. Marine erosion has scoured out the Strait of Dover, leaving a sea passage full of shoals, where the depth is only 30 fathoms (55 metres). The North Sea is similarly shallow. We may allow for the thickness of glacial drift that burdens the floor of the North Sea and of the Irish Sea, and yet discover no structural features that cut off the British Isles from Europe.

Highlands
and low-
lands :
distribu-
tion.

Viewed as a whole, the highlands of these isles lie on their west and north-west side, and Scotland includes the largest body of land over 1,000 feet in height above the sea. The lowland of this country is restricted to the worn-down Outer Hebrides, to a marginal zone on the coast of the North Sea, and to a basin running across the country between the Firths of Forth and Clyde. Ireland, on the other hand, is marked by a great central lowland and a hilly margin; but its most rugged country is characteristically grouped on the north-west. Wales and the Lake District form a western boundary for the tillage lands of England, and these lands have more affinity with the floor of the North Sea than with the wilder country on which they overlap. There is good evidence that the submerged area between England and

Norway includes a large extent of Cretaceous strata. The presence of these yielding rocks on the east side of England has led to a smooth coast-line. The sea has worn away the lower portions of the river valleys, and the tidal inlets that record the submergence are comparatively rare. On the west, however, and notably in the case of Scotland and of Ireland, rocky promontories are common; marine erosion has been unable to keep pace with the subsidence that has admitted the sea into the land.

The remarkable variety of surface features in the limited compass of the British Isles is intimately bound up with a complex geological structure, connected with that of various parts of Europe. The ancient region of crystalline rocks that remains exposed in the peninsula of Scandinavia is obviously continued across the Scottish highlands and through the north-west of Ireland. The main structural lines of Brittany, Belgium, and the Hercynian lands of northern Germany are traceable through Devon and Cornwall, South Wales and southern Ireland. The Jurassic and Cretaceous scarps of central England find their counterparts on the other side of a broad synclinal basin, as we travel from Paris into Burgundy.

Geological relations with the continent of Europe.

From opposite sides of the channel that separates these areas, the Normans and the Plantagenets claimed, in successive invasions, lands that bore an evident kinship with their own. At an earlier date the Scandinavians and the freebooters of Friesland and the Baltic had no difficulty in arriving on the British shores by sea. The Shetlands and the Orkneys, for the northern rovers, seemed to lie somewhere off the Norwegian coast; and these adventurers were readily reminded, by the sea-lochs of the west of Scotland and the inlets from Strangford round to Limerick, of the sheltering fiords that they had left behind some weeks before. Still earlier, Mediterranean peoples had probably entered Ireland by the easy passage of the sea; and to this day the ocean highways provide the simplest means of travel for the peasants of Cork or Connemara.

Physical relations and human emigration.

In such a geographical position, the British Isles have

absorbed tribe after tribe without being at any time overrun by invading hordes (cf. Chap. XI). Their inhabitants have remained within the influence of European culture; but at the same time, like other dwellers on the western seaboard, they have felt the call of the ocean that reaches round the world.

The
highland
region.

The 'Caledonian' earth-movements, occurring at the close of the Silurian times, are responsible for the Highland Region of northern Scotland and north-west Ireland, and the great folds then established have never been obscured by later crumpling. Not only were the deposits of the pre-Cambrian seas worked up, and overthrust against the floor on which they had been laid down, but portions of that early Archaean floor also became involved.

In
Scotland:
the wes-
tern
islands
and coast.

This floor, the oldest land-mass in the Britannic region, forming a portion of what has been called the Huronian continent, is revealed in the worn-down gneissic band of the Outer Hebrides, and in the rugged country from Cape Wrath southward to the Sound of Sleat. Two series of rocks are here easily apparent. The crystalline gneisses and schists, including igneous masses which have broken through still more ancient sediments, are surmounted by huge fort-like blocks of the Torridon sandstone, above which Lower Cambrian deposits have been traced. The Torridon sandstone, which is thus proved to be pre-Cambrian, displays its stratified structure from a distance, and the singular mountains now formed from it are relics of a deposit that accumulated in the hollows of the underlying gneiss, and at one time buried the irregularities of a continental surface. Denudation has carved out glens between blocks some 3,000 feet (900 metres) in height, and the vertical jointing has assisted the formation of barren precipices, or mountain-sides on which the strata terminate in great rocky steps. Viewed from the Minch, this foreland, with the grey hummocky gneissic land below, and the brown outliers glowing in the evening sun, presents one of the strangest landscapes in the British Isles.

The in-
land
highlands.

Eastward stretches the highland country that occupies

so much of Scotland, a region of greatly altered stratified rocks, which were probably metamorphosed before the Caledonian folding, and were then further rolled out and rearranged. Mica-schists, limestones, and quartzites, known as the Dalradian Series, are now grouped in a series of folds running north-east and south-west, and great intrusive masses of granite, like those of the Moor of Rannoch or of the high domes of Aberdeenshire, broke through them in early Devonian times. The earth-movements that reared the great mountain-chain, of which the Grampians are held to be a dissected remnant, did not cease until they had involved some of the formations gathering on its slopes and hollows. The line of weakness that is marked by the Great Glen from the Moray Firth to the Firth of Lorne originated in a fault that has affected the Old Red Sandstone of Loch Ness. Traces of Devonian lake deposits, laid down on the Caledonian surface, remain in places, as in Caithness and the Orkneys, or lifted high on the slope of Ben Wyvis above the Cromarty Firth. The Upper Old Red Sandstone of Scotland, unconformable on the Lower Series, represents the waste of continental land that was still in a condition of unrest.

The relation of the great mass of Grampian schists to the Torridon series is one of the problems of British geology. Rocks, however, that are regarded as Torridonian are involved in the metamorphic series of the islands of Colonsay and Islay.

The north-west highlands of Ireland obviously continue, in structure and constitution, the ranges of the Grampians, but on a somewhat milder scale. Donegal, with its folded mica-schists and dominating crests of quartzite, repeats the features of Argyll and of the Perthshire moors. Kintyre is continued in north-east Antrim. The Caledonian trend is emphasized by intrusions of granite along the north-east and south-west folds, while a weak line in this direction has allowed of the excavation of Glen Veigh and the valley of the Gweebarra. The denudation of the covering of Carboniferous rocks reveals

a conspicuous Caledonian axis, with a core of granite, running from Manorbhamilton in Leitrim to Castlebar in Mayo. The west of Mayo, largely formed of quartzite, and the metamorphosed sedimentary masses of the Twelve Bens in Connemara, further recall the later pre-Cambrian rocks that are folded and overfolded in the Scottish highlands. The quartzites of southern Mayo, however, including the fine cone of Croagh Patrick, have been shown to be of Silurian age, and were also crumpled during the Caledonian thrusting. South-westward of Connemara, the Caledonian folds are lost beneath the Atlantic on the faulted margin of the continent.

Eocene
and Oligo-
cene addi-
tions to
British
highlands.

The Highland region of the British Isles has been remarkably enriched by additions that heralded, in Eocene and Oligocene times, the growth of modern Europe. The complex volcanic piles of the Inner Hebrides, worn down so as to reveal their crystalline cores, are paralleled in Ireland by the lava plateaus of Antrim and eastern Londonderry, and by the intrusive masses of Slieve Gullion, Carlingford, and the Mourne (Plate I, a). Both in Scotland and Ireland, the outpouring of lavas has allowed of the preservation of interesting relics of Mesozoic strata. The columnar structure of some of the basaltic flows, a phenomenon of contraction during cooling, has made the colonnades of Staffa (Pl. XIX) and the Giants' Causeway famous throughout the world. Rum, Eigg, Mull, and the core of Arran in the Firth of Clyde, attest the resistance of the igneous centres to the weathering prevalent in the west; but abundant dykes of basalt, penetrating the pre-Cambrian rocks of the mainland of Scotland and of Donegal, and belonging to the same late epoch of eruption, show how large a volcanic covering has been stripped from off the Highland region.

The
Silurian
lands.

Ordovician (Lower Silurian) and Gotlandian (Upper Silurian) strata constitute a number of upland regions in the British Isles which have a distinct character of their own. The rocks are mostly shales passing into slates, and fine-grained sandstones passing into splintery and quartzitic types. The crumpling of these beds gives



PLATE 1 (a). MOURNE MOUNTAINS, CO. DOWN, IRELAND



PLATE 1 (b). MILLERSDALE, DERBYSHIRE
(Phots. Professor Greyville Cole)



PLATE II (a). BEN BULBIN, CO. SLIGO, IRELAND



PLATE II (b). NEW FOREST: NEAR BURLEY, HAMPSHIRE
(Photo. Professor Grenville Cole)

rise to a hummocky country, in which the sandstones, often called grits, stand out in bosses and irregular bands. The intercalation of igneous rocks imparts a mountainous character to many of these Silurian lands. Involved as they were in the Caledonian folding, the general strike of the beds is north-east and south-west, a feature that is conspicuously seen in the Southern Uplands of Scotland and in their continuation into the heart of Ireland.

The Southern Uplands may be held to begin with the Lammermuir Hills, and they continue as grassy moorlands to the sea in Wigtownshire. Near Moffat, they rise to heights of over 2,500 feet (760 metres), and even their lower flanks retain to a remarkable degree the character of mountain land. The denudation that they have suffered, however, is seen in the prominence of such granite masses as those which culminate in Cairnsmore of Fleet near Creetown, and Criffel, the guardian of the Solway, near Dumfries; for it is clear that these granites must have been intruded under a considerable depth of Silurian rock. Old Red Sandstone covers the Silurian beds unconformably in the district between Haddington and the Cheviots, and lavas of Devonian age contribute greatly to the latter group of hills.

Following the southern uplands over the Mull of Galloway and across the deep sea-channel, we reach Ireland on the low shores of Down near Strangford Lough. The tumbled ground stretching south-westward almost as far as Longford town may be summarized as the Caledonian axis of Newry, containing a core of granite, which is revealed near Newry and Cavan. Except in the granite region, there is no conspicuous line of heights, and the amount of Silurian and later material removed by denudation, even since early Cainozoic times, may be gauged by the bold exposure of the crystalline rocks of Carlingford and the Mourne Mountains, which have been connected, as is seen above, with the igneous activity of Antrim and the Inner Hebrides.

To the south-east of this Scottish and Irish axis, English Ordovician rocks, including the volcanic Borrowdale Series, English Lake District.

are exposed in the Lake District of England. The Cambrian slates that are revealed in the base of Skiddaw are repeated on a bolder scale in the mountains of the Isle of Man. Highly siliceous volcanic rocks, probably of the age of the Llandilo Series, impart craggy features to the Lake District, which otherwise might have repeated the smooth moorland slopes that are common in the Southern Uplands.

Leinster
Chain.

The extent to which Silurian rocks form a groundwork for later systems in the British Isles may be seen in their frequent appearance as inliers in the crests of the Armorican folds throughout Ireland. A large area, however, which perhaps was never entirely covered by the Carboniferous sea, remains exposed in Leinster, and its structure must be read in connexion with that of Wales.

The Leinster Chain is the north-eastern part of a Caledonian axis of elevation; its south-western end remains concealed by Carboniferous and Devonian strata. Crumpled as the rocks are upon its flanks, it forms broadly a single anticlinal mass, in the centre of which granite has welled up. Here and there, on the crest of the great upland, patches of metamorphosed Silurian rock remain; but the granite is now exposed as a high central moorland over a distance of some sixty miles. The rounding of the summits into their present characteristic domes, and the widening of the valley-heads into broad upland basins, must have proceeded far during Devonian times, since pebbles of the granite core are found in the Carboniferous limestone of the plain. The foothills of Silurian strata on either hand, consisting, as in the Newry axis, of shales, slates, and sandstones, weather out into more broken forms and are trenched deeply by the consequent streams. A number of minor ridges are formed along the strike on the south-east side of the chain by rhyolites, quartz-porphyrries, and dolerites that were associated with Silurian volcanoes, or were intruded, like the granite, in early Devonian times. Slates and quartzites, probably of Cambrian age, appear in the east of the counties of Wexford and of Wicklow, where the quartzites weather

out in picturesque knobs among the more yielding argillaceous rocks. The granite moorland itself is in great part 2,000 feet (600 metres) above the sea, and culminates in Lugnaquilla (3,039 feet; 926 metres) in the heart of Wicklow.

Fossils of the Arenig Series have been found in the shales of the Wexford coast; but the typical Cambrian rocks of Wales have no known representatives in Ireland. They occur in what is known as the Merionethshire anticlinal or pericline, between the craggy walls of Cader Idris and the spurs of Snowdon. The lower beds, the grits of Harlech, provide barren and rugged scenery north-west of Dolgelly. Another area, including the slates of Llanberis and Bethesda, is exposed in the north-west of Carnarvonshire, and its uptilted strata form the foothills that lead to Carnedd Llewellyn and to Snowdon.

North and
Central
Wales.

Ordovician rocks form the promontory of Carnarvonshire, which is directed towards Ireland along the Caledonian strike; they lap round the Cambrian area to the east and south, and thence occupy a wide field southwards almost to Carmarthen Bay. In the northern part of this district two great series of volcanic rocks were intruded and partly extruded, contemporaneously with the deposition of the strata. Round about the Merionethshire pericline, highly siliceous andesites and rhyolites, mostly of Arenig age, have weathered out into high scarps, and are responsible for the bold features of Cader Idris, Aran Mawddwy, and Arenig Fawr. The summits of these mountains, nearly 3,000 feet (900 metres) above the sea, are features in a ring of steep rock-walls. Here and there, as at Ffestiniog, we obtain glimpses of the cauldrons from which these lavas flowed. The still finer heights of the Snowdon district, culminating in Y Wyddfa, 3,560 feet (1,085 metres), are due to the resistance of a second series of rhyolites, erupted in the Bala epoch. The present forms of the mountains, however, have little to do with the disposition of the rocks round the original centres of eruption, and the most striking features, such

as the great cirques of Snowdon, date only from the Glacial epoch.

Cardigan,
Carmar-
then, &c.

The country southwards from Cader Idris is broken and mountainous, and, when first traversed, seems to owe its present forms to local accidents of denudation rather than to any broad structural lines. But a watershed is traceable on the grassy moorlands, running south-west through Cardiganshire to Carmarthen. This is formed of an elevated synclinal series. Two fine rivers, the Teifi and the Towy, flow down on either side of it along the Caledonian strike. This axis of central Wales, for the most part, lies only ten or twelve miles inland from the sea, and is notched near Plynlimon by the headwaters of the Severn and the Wye.

Eastward, Gotlandian beds are well represented, weathering out in a series of escarpments and dipslopes, and passing up into the brown Devonian sandstones of Brecknock and of Hereford. In Denbighshire, the heather-clad uplands between Llanrwst and Llangollen are formed of slates and sandstones of Gotlandian age.

Devonian
and Car-
boniferous
Regions.

From a geographical point of view, the Old Red Sandstone and the overlying Carboniferous strata may be well considered together in the British Isles. They are closely associated as successive deposits on the old Caledonian surface, and the contrasts in their constitution have a powerful effect upon the scenery.

Central
Lowland
of Scot-
land.

In the Central Lowland of Scotland, between the Firths of Forth and Clyde, the earth-movements at the close of Silurian times did not produce the considerable folding that is apparent both to the north and south. A basin remained here on the new continent as the successor of the Gotlandian sea, and freshwater sandstones and conglomerates gathered in it from the uprising land. Volcanic eruptions contributed abundant andesitic lavas, and these, weathering out as long edges across the country, form characteristic features on the Highland border. The Lower Old Red Sandstone, however, became in time disturbed, and the Upper Series, heralding a subsidence

that brought in the Carboniferous sea, lies on it with striking unconformity. Limestone plays a far smaller part in the Carboniferous deposits of Scotland than it does in central England. A shore-line lay near at hand to northward, and sandstones and coal-seams occur through a large part of the Lower Carboniferous Series. The Upper Carboniferous Coal Measures are also present, and this synclinal basin of central Scotland, with its considerable variety of rocks, its comparatively low level, and its fertile soils, has formed a natural and attractive site for agricultural and technical industries. The region is bounded by faults on the borders both of the Highlands and the Southern Uplands.

Across the bleak passes of the Cheviots to the southward, a broad expanse of Carboniferous sandstone stretches through Northumberland, and the lands are largely given over to grazing rather than to tillage. The Coal Measures of Newcastle-on-Tyne and Durham furnish a very hilly country on the east side of the Pennine Chain. As we go southwards we meet the characteristic scarped plateaus of Carboniferous Limestone in northern Yorkshire, varied by cappings of Millstone Grit. The limestone surfaces are sometimes devoid of soil, and the terraced weathering of the strata is conspicuous across the country. The limestone comes up along a broad anticline, running north and south, and the covering of Millstone Grit is preserved continuously from near Skipton to the Peak in Derbyshire. On either side lie the great coal-fields of Lancashire and Yorkshire.

From the Peak southwards we enter the country of the Dales (Pl. I. *b*), where the rivers have cut into the limestone, forming characteristic ravines bounded by sheer cliffs. In Derbyshire, as in central Yorkshire, the plateaus above the valleys show numerous swallow-holes, and beneath them everywhere lies a fascinating underworld of unseen waterways and ramifying caves.

The movements that reared the present Pennine Chain have been traced on into the Cainozoic era; but the region was, primarily, folded by the Hercynian or Armorican

movements at the close of Upper Coal Measure time. These movements, however, are far more typically displayed in the east and west ridges of southern Ireland and South Wales.

Southern
Ireland.

In southern Ireland, the Armorican folding has produced a series of close-set anticlines and synclines, overfolded in places, and involving Millstone Grit and Coal Measure strata, which have mostly been stripped away. The underlying Carboniferous Limestone became worn down into a fairly even surface somewhere about Permian times, and Triassic beds may have been deposited across the denuded edges of the folds. But as weathering was renewed, and was continued into our own times, the limestone became so far thinned upon the anticlines that the more resisting conglomerates of the Old Red Sandstone began to stand out from below. East-and-west bars thus rose above the general surface of peneplanation, and these form to-day the ridges of the Dingle Promontory, the Galty Mountains, the Knockmealdowns, the Reeks of Kerry, and the broad upland that extends as far east as Helvick Head in the county of Waterford. Even where, as in the county of Cork generally, slaty beds represent the limestone, similar features have been carved out, though on a less striking scale. The result is that barren ranges of Old Red Sandstone divide long narrow valleys in which the Carboniferous Limestone or Slate still remains. The conglomerates and sandstones are sometimes covered with heather and are sometimes swept bare by wind and rain. In the east-and-west synclinal valleys, on the other hand, vegetation flourishes, and the woods along the Blackwater are among the noblest in the kingdom. On MacGillicuddy's Reeks the Old Red Sandstone rises in Carratuohill to 3,414 feet (1,140 metres), while heights of over 2,000 feet (600 metres) are common on the corresponding fanges to the east.

North of the region of most intense crumpling, anticlinal domes of Old Red Sandstone rise through the Carboniferous Limestone, and many of these, as for instance the Galty and the Slieve Bloom Mountains, include cores

from the Caledonian mass on which their strata were laid down. When once the crest of the dome of conglomerate and sandstone was worn away, denudation carved out basin-like depressions in the Silurian shales below, the detritus being carried out through some breach in the surrounding wall. Areas of arable land, looked down on by barren sandstone scarps, are thus a common feature. The fine crags of the Comeragh Mountains, where they terminate abruptly in County Waterford, contrast similarly with an upland plateau of Silurian strata to the east.

To the north of the Galty Mountains the folding is by no means so intense, and limestone has been preserved as a great plain stretching northward to Donegal Bay and from sea to sea between Galway and Dublin. Near Sligo (Pl. II. a), however, it forms plateaus and dales like those of Derbyshire, and in the north of Clare the features common in highly porous limestone regions with sufficient rainfall (karst features) have been developed on the wind-swept surfaces of terraced limestone uplands. The limestone has been worn away from the axis of Newry, and from the Devonian inliers already mentioned. The trend of the latter becomes north-east and south-west between the Leinster Chain and the pre-Cambrian mass of Connemara, and indicates how compression was here influenced by the earlier Caledonian folds. The Leinster Chain, in fact, was displaced as a block towards the north-west by the Armorican movements. Two synclinal outliers, the coal-fields of Leinster and Tipperary, remain on its west side, and Upper Carboniferous beds, with unproductive Coal Measures, are found also in northern Kerry, Limerick, and Clare. Here denudation by the Atlantic, acting along horizontal or uptilted bedding-planes, produces stern cliff scenery. East and west of Lough Allen, where the outcrops occur high upon the hills, and in a small but rich basin near Dungannon in Tyrone, Coal Measures have also been preserved.

Passing across St. George's Channel to South Wales, the Armorican folding is clear in the rock-structure about

Central
limestone
plain.

South
Wales.

Devon,
and
Cornwall.

Milford Haven, and the broad synclinal basin of the South Welsh coal-field shows that the crumpling became less close towards the east. The Mendip Hills, an anticline which includes Upper Old Red Sandstone, records the same system of folds. In Devon and Cornwall we find marine Devonian slates and sandstones, broadly forming a synclinal. Lower and Middle Carboniferous 'Culm Measures' occupy a central position in this basin, stretching across Devonshire to the coast between Bideford and Boscastle. The granite of Dartmoor, intruded at the close of the Armorican movements, provides a barren and rock-strewn upland some twenty miles across. The surface of Cornwall is less diversified, the uplifted peneplane of southern Ireland being repeated across intrusive granite and crumpled slate alike. Moorland scenery is prevalent in the interior, where the plateaus rise to 1,000 feet (300 metres).

Plains of
Central
England.

The coal-fields of central England are exposed as inliers in the plains, which are treated in the following section.

The wearing down of the Armorican land surface, with its mountainous system of folds, and its resuscitation of Caledonian masses that had been lost beneath the Carboniferous sea, became remarkably complete in what is known as Stephanian time. The highest (Stephanian) Coal Measures of France have no representatives in the British Isles, where the Permian strata, terrestrial and marine, strike right across the Carboniferous folds. The Magnesian Limestone of Durham, outliers of which occur as far west as Tyrone, thus lies on Coal Measures at Sunderland, on Carboniferous Limestone in Yorkshire, on Millstone Grit in the mouth of Wharfedale, and on Coal Measures again as far south as Nottingham. The Permian 'breccias' of Worcestershire may record, as Ramsay long ago suggested, the glacial conditions of Permo-Carboniferous times, while those of the red cliffs of eastern Devonshire represent taluses and downwash accumulated on a dry land surface. Above the Permian deposits spread the almost level Triassic Series, which are responsible for a large part of the central plains of England.



PLATE III. THE SEVERN VALLEY AND MALVERN HILLS, FROM THE COTSWOLD

ESCARPMENT

(Great Western Railway Co.)

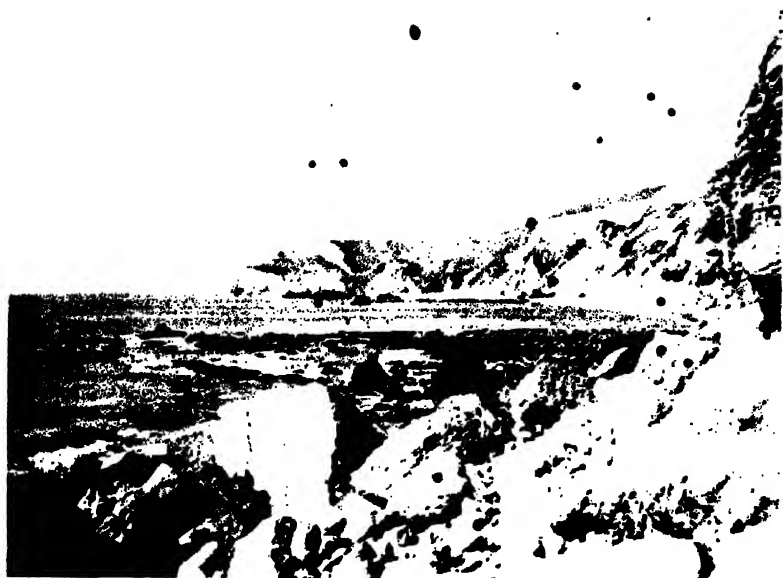


PLATE IV (*a, b*). CHALK CLIFFS, ETC., DORSETSHIRE
COAST, NEAR LULWORTH COVE
(Photos. O. J. R. Hewarth)

The beds of pebbles that occur so often towards the base of the English Trias represent the flow of broad rivers over continental land. These rivers may have been merely seasonal. Rock salt and gypsum occur in Worcestershire and Cheshire, as the products of desiccating lakes. The sands are such as gather in deserts, and the underlying granite in Leicestershire is scored by wind-borne grains. Subsidences of the surface, owing to the solution of salt and gypsum, are believed to have given rise to the 'meres' of northern Shropshire, and are common where brine-pumping is resorted to in the mining districts. The pebble-beds promote hilly land in places, with scarps facing the north-west; but on the whole the Triassic area forms a plain, which is devoted to agriculture and fruit-farming. Here and there, as at Ashby-de-la-Zouch and Walsall, inliers of Permian sandstone and Coal Measures break the surface, and a considerable amount of mining is now carried on through the Triassic strata.

Pebble beds; salt and gypsum deposits.

From the pleasant heart of Warwickshire to the sea at Liverpool and Chester, and in a broad land northward along the east side of the Pennine Chain, the plain provides some of the finest lands of rural England. Between Doncaster and York it has been flooded by alluvium, and the surface becomes more uniformly level. The Liassic beds (Lower Jurassic) remain along the whole eastern and south-eastern border of the Trias, and they formerly spread right across it into Ireland. They consist so largely of shales and clays that they merely add to the area of the great plain, except where they have been so far protected by the Middle Jurassic limestones of the Cotswold scarp as to form rising ground on the long front of the hills.

Agricultural lands.

The Permian and Trias of Scotland have left unimportant outlying relics near Elgin and the Solway, and their chief contribution to the country is the handsome red sandstone of which Dumfries is built. In Ireland, but for an outlier over Coal Measures on the Newry axis at Kingscourt, and another at Armagh, these systems are

Permian and Trias of Scotland and Ireland.

confined to the margins of the basaltic plateaus. The red Triassic beds are conspicuous under the white chalk at Murlough Bay and Moneymore, and in the Lagan valley near Belfast.



FIG. 1. Natural Regions of England and Wales.

The great English escarpments.

The outstanding feature of the structure of England is the escarpment of Jurassic limestone that runs from the Cleveland Hills near the Durham border to Bridport on the coast of Dorset. The country is thus divided down its centre, and a western region, diversified by frequent

inliers of Palaeozoic rock, is cut off by a steep barrier from a land of long dip-slopes and far-reaching escarpments on the south-east and the east. To state the matter in another way, the former mantle of Jurassic and Cretaceous strata has been worn back from the north-west as far as this dividing line. The Jurassic scarp is most conspicuous in the Cotswold Hills of Gloucestershire, where its crest is often more than 1,000 feet (300 metres) above the sea, and the term Cotswold Escarpment may be applied to the whole barrier (Pl. III). At Lincoln this rises to little more than 500 feet; but the deeply dissected plateau of Jurassic rocks reaches 1,400 feet (425 metres) in the Cleveland Hills of north-east Yorkshire. Streams flowing down the face of the escarpment have notched it conspicuously in Northamptonshire, Oxfordshire, and Gloucestershire, exposing the Liassic beds below. Outliers, indicating the recession of the escarpment, remain as conspicuous features above the Liassic plain upon the west.

The dry upland of weathered yellow limestone falls with the dip south-eastward, and higher Jurassic clays, producing level land, rest on it before we reach the second midland scarp. This is formed by the Cretaceous beds, which overlap the Jurassic Series, so that in the Blackdown Hills of eastern Devonshire, and in the Yorkshire Wolds north of the Humber, they conceal even the border of the Lias. Such places no doubt indicate valleys cut in the Jurassic beds, which were entered by the returning Cretaceous sea. Ordinarily, an escarpment of Lower Cretaceous sands lies in front of a more conspicuous one, the Chiltern escarpment, formed of chalk. The Chalk also dips south-eastward from the rounded downs upon its edge, passes under the Cainozoic beds of the London Basin, and emerges again in the north of Kent and Surrey.

The broadest area of Chalk lies between Warminster and Petersfield, its western portion forming the undulating upland, covered by thin grass, euphemistically known as Salisbury Plain, and lying often 500 feet (150 metres) above the sea.

South-
eastern
England.

Between the escarpment of the Chalk and the coasts of south-east England lies a region of Mesozoic and Cainozoic rocks, which was folded during the Alpine movements, and was probably influenced in its present structure by the east and west Armorican folds that lie below. The broad synclinal of the Chalk following on the Chiltern escarpment finds its complementary anticline in the Weald. The syncline that follows on the south is much steeper on its southern side, and the Cretaceous beds rise to a vertical position in places between Weymouth and the east end of the Isle of Wight. A small part of the next anticline is preserved in the Jurassic beds of the coast of the Isle of Purbeck and in the almost level outliers of Chalk, with Lower Cretaceous beds under them, at the south side of the Isle of Wight. Where the Chalk comes to the sea along the south coast, slips of rock are frequent, owing to undermining by the sea, and fresh cliff-faces some 500 feet in height are thus maintained (Pl. IV).

The
Weald.

The broad Wealden inlier, open towards the sea on the east, and closed on the west towards Salisbury Plain, results from the breaching of the central anticline. The main rivers run northward and southward from it, being consequent on the original surface of the arch, while subsequent tributaries have worked away the crown of the arch and have formed the escarpments that face one another across the Weald. The lowest Cretaceous sandstones are now exposed in the centre, on the fir-covered ridge of Ashdown Forest: the Wealden clay, deposited in the same freshwater area, follows on either side; and above it rises the escarpment of the Lower Greensand or Aptian Series, in which cherty sandstones produce resisting hills some 800 feet (250 metres) or more above the sea. This escarpment, culminating in Leith Hill (965 feet; 294 metres) in Surrey, and reaching 895 feet further west at Hindhead, is much bolder on the north side of the anticline than on the south. The Chalk escarpment behind it, on the other hand, is usually higher (800 feet) on the south; the North and South Downs formed by it, and the Lower Cretaceous escarpments that succeed them

towards the Weald, meet picturesquely in Harting Combe near Petersfield.

The northern Cretaceous synclinal is largely covered by the Eocene strata of the London Basin, while Pliocene beds in Norfolk, Suffolk, and Essex, record a far later

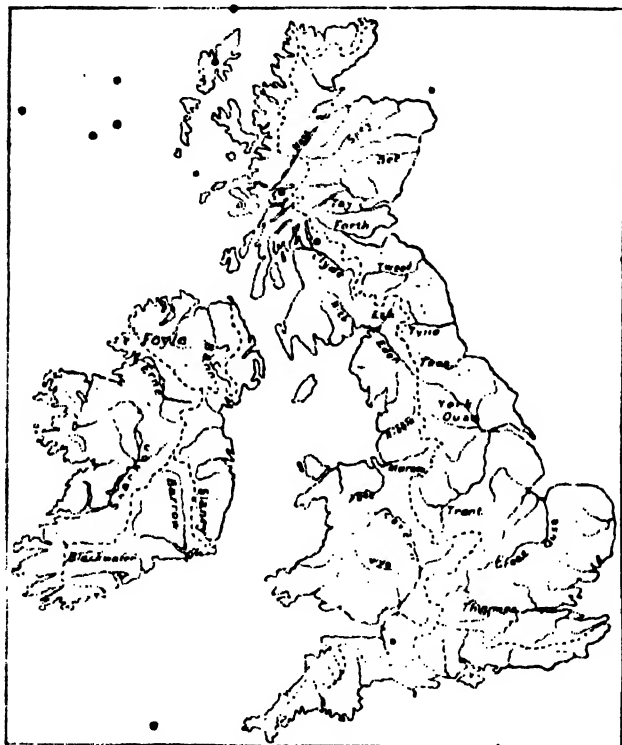


FIG. 2. The chief Rivers, River Basins, and Divides. The main divides between rivers flowing N., S., E., or W. are shown by dashes, the minor divides by dots.

invasion by the sea. The Lenham beds, occurring as sandy marine outliers on the edge of the Kentish Downs, are also Pliocene, and show the recent date of the denudation that has exposed the Weald. Eocene strata reappear in the southern synclinal, which forms the Hampshire Basin south of the Weald. In this area, moreover, Oligocene beds were deposited, and are well represented in the north of

the Isle of Wight. The hills that occasionally rise above the general plain of London Clay round London are mostly capped by Pleistocene gravels, which were at one time continuous across the basin. London itself is built in large part on the later and far more localized river-gravels of the Thames. Gravels derived from the flints in the Chalk occur frequently throughout the south-east of England, and cap the level strata of the New Forest (Pl. II, *b*) to an extent that hampers agriculture. They are still accumulating in the modern 'combes' and 'dry valleys' of the Downs. They can be dredged in large quantities from the floor of the English Channel, and far away in the Atlantic off the Irish coast. They bear witness everywhere to the vast extent of Chalk that has been lost by denudation between Oligocene times and the present day.

Surface Features of Scotland

The
Outer
Hebrides.

The Outer Hebrides reveal what part of the interior of Scotland would be like if the mantle of later schists were cleared away. At the same time, they record the appearance of the land-surface of the oldest continent of which we have any trace in Europe. Drowned valleys, 'tarberts' or boat portages, and the sounds between the islands, indicate how subsidence has influenced their present forms. The sea-inlets on the east coast of South Uist almost cut across the island. The smooth western coast of Benbecula and of South Uist is due to the battering of the Atlantic waves. The gneissic surface has been severely glaciated, and lakelets have formed in the hollows between rounded bosses of bare rock. Some of the hills, as in Harris and South Uist, still rise more than 1,500 feet (460 metres) above the sea; but their brown bog-covered slopes and their rounded summits do little to break the monotony of the landscape.

It is believed that the faulting which is so apparent throughout Scotland along the axes of Caledonian folding is responsible for the hollow of the Minch.

¹ 'Tarbert' or 'Tarbet' is not uncommon as a place-name.

The Shetland Islands are similarly indented with drowned valleys, here called 'voes', and communications are maintained almost entirely by sea. The district is an isolated piece of the north-east Highlands, including granite and Old Red Sandstone, and an older ground of

The
Northern
Isles.



FIG. 3. Physical Divisions of Scotland.

metamorphic rocks. The hills in places have been cut into by the sea, and the Noup of Noss on the east coast is a cliff falling 600 feet sheer from the crest of the island. Another fine cliff, also formed of terraced Old Red Sandstone, occurs on an outlying relic of lost land, the isle of Foula.

The Orkney Islands are more fertile, being covered by Old Red Sandstone, which forms a broad treeless lowland.

In Hoy, however, the rocks rise to heights of 1,500 feet (460 metres), and bold sea-cliffs have been carved out on them.

Caithness. Caithness is for the most part a somewhat monotonous Old Red Sandstone country, merging into highland features on the south-west. Its coast exhibits characteristic terraced cliffs, with deep grooves cut back in them by denuding agents working along the joint-planes.

The Inner Hebrides. The features of the Inner Hebrides are largely due to igneous rocks of Cainozoic days. In the centre of Skye and Mull we find the relics of localized cauldrons of molten rock. The south-east of Skye is a portion of the Inverness coast, cut off by the subsidence that has connected the head of the Sound of Sleat with the lower part of the drowned valley of the Shiel. But, on rounding Kyle Akin, the broken moorland of Torridon Sandstone on Sleat gives place to a landscape where crystalline igneous rocks have been dissected by valleys that have almost reached the sea-level, leaving craggy hillsides 3,000 feet (900 metres) above their floors. The long pink-brown taluses on the granite domes are contrasted with the rugged walls of gabbro, which furnish hardly any soil. Glaciation has rounded and smoothed the lower spurs, while the irregular clefts in the black crests of the Coolin (Cuillin) Hills (Pl. V) give them a serrated outline visible miles away at sea. Even the level basalts of the plateaus to the north, penetrated by intrusive sheets, yield bold features along the coast, and the cliffs near the Storr Rock, with a second pinnacled wall rising from the grassy terrace on their crest, present some of the wildest scenery in our islands. The conical mass of Rum repeats the features of central Skye, and Eigg, largely volcanic, is surmounted by a striking ridge of glassy lava.

Mull, Iona, Jura, Islay, &c. The Isle of Mull is deeply indented by sea-lochs on the west. From the landing-place at Auchnacraig, two easy passages run through the interior, mostly across basaltic ground. One of these leads north-west to the coast at Salen, and the other reaches Loch Scridain by the 'through valley' of Glen More. The terraced structure of the



PLATE V. THE COOLIN HILLS, ISLE OF SKYE, SCOTLAND, LOOKING N.E. FROM ABOVE
LOCH BRITTLE
(Phot. O. J. R. HOWE)



PLATE VI (a). LOCH LINNHE, WEST COAST OF SCOTLAND



PLATE VI (b). STRONTIAN VALLEY AND FALLS OF ARDGOUR
• ARGYLL, SCOTLAND

(Photo. Of J. R. Howarth)

basaltic lava-flows is strikingly seen in the forms of the headlands and islets west of Ben More. Staffa is a relic of one of these flows; the sea has eaten out caves among the vertical shrinkage-columns of its lower portion, while the more irregular upper portion remains as a resisting roof. The low wind-swept isles of Iona, Tiree, and Coll are continuations of the band of ancient gneiss that fringes the coast of Sutherland and Ross. Jura and Islay are similarly detached masses of the highland rocks that strike north-east across Argyllshire. The quartzite that forms the main mass of Jura rises in two domes in the south, the well-known Paps of Jura, 2,500 feet (760 metres) above the sea. The island is a continuous ridge of quartzite with a less resisting schistose fringe upon the east, along which the foot-track runs for twenty miles. The surface of Islay is more varied and more hospitable. The geological structure epitomizes that of the southern highlands, and Islay connects Scotland with the Dalradian lands of Donegal.

The narrow valley of Glen More has been excavated along a line of structural weakness, and forms, with the aid of a few canals, a remarkable thoroughfare across the highlands, known generally as the Caledonian Canal. Lochs Ness, Oich, and Lochy still remain inland lakes. Loch Linnhe, on the other hand, opens on the Firth of Lorne, and, with Loch Eil at its head, admits the sea thirty miles into the land. The fact that such inlets result from the submergence of typical highland glens is realized as one looks up Loch Eil from Fort William, or up Loch Leven and the valley of Glencoe from their junction at Ballachulish. At the south side of Loch Linnhe, the Sound of Mull severs Mull from Morven, and a drop of some 300 feet would make two new islands out of the extensive and mountainous regions of Morven and Ardgour. Here, as is general in the Western Highlands, the streams, aided by glacial action, have worn down their beds deeply across very rugged uplands, and the mountain walls reveal their full heights above the sea. The floors of the valleys are commonly U-shaped, and

The
Scottish
highlands.

there are frequent signs of the over-deepening of older and broader forms. The system of fiords that marks the Atlantic coast has been variously attributed to submergence and to glacial excavation below sea-level. J. W. Gregory, in agreement with many Scandinavian geologists, has pointed out how the inlets follow certain main directions, often at right angles to one another, which resemble those of crossing fractures in the crust. It is urged that the sea has penetrated the land along these lines of weakness and of movement. There has not been sufficient time, since the ice-streams left the fiords, for the accumulation of masking taluses under the steep hill-sides. Grass-covered flats due to raised beaches, and alluvial infillings where the valley and the sea-loch meet, occasionally provide space for little crofts. The villages, mere hamlets, are usually set at the loch heads ; but many of the inlets run ten miles or more into the recesses of gloomy hills, where a ruined cottage here and there indicates the economic changes in the highlands.

The watershed and natural lines of communication.

The watershed of the highlands north-west of the Great Glen lies near to the west coast, along the line of over-thrust masses that flank the Torridonian hills. South-east of Loch Ness, Strath Spey runs as a broad valley along the general strike of the Grampian folds, and opens on the low ground that spreads through eastern Aberdeen. South of Strath Spey, the watershed of the Grampians lies on a series of barren moors. The valley of the Garry, stretching back from the highland edge below Dunkeld, forms a natural highway for the one great road across the hills. The whole highland region has the appearance of a dissected plateau, the numerous summits rising to much the same height, 3,000 feet (900 metres) above the sea. Ben Nevis, an intrusive granite mass capped by Devonian lavas, at the head of Loch Linnhe, reaches 4,406 feet (Plates VI, a ; XXII). Most of these mountains, however, are cumbered on their very summits with products of their own decay. They have been exposed so long to denudation that they are mere upstanding bosses of the basal portion of the ancient Caledonian

chain. It seems too late to ask where the axis of this chain once lay, and the peneplane of which we now have traces dates probably from Triassic times.

The profound and complicated dissection of the country has led to a lack of communications, and to the strengthening of the clan system, with its strongly localized loyalties and mistrusts. Along the coasts the Norsemen brought in new blood and a roving intercourse with Europe; but the upper reaches of the fiords were always highland. To this day the deep trenches of the glens and the rocky barriers on the sky-lines have moulded the whole life of the romantic country that lies between the tourist hotels of the west and the cultivated lowland of eastern Aberdeen (Pl. VI4).

At Dunkeld we leave the moors of Atholl and the forests and cross the rich farm-lands of Strathmore. The highland boundary lies sharply marked behind us. Loch Lomond breaks this line near Glasgow, and its lower waters expand on the Old Red Sandstone, in a basin enriched by glacial drift. The 'Lowlands' are merely low in comparison with the highland mass to northward, and their surface is diversified by igneous rocks of various ages. Permian volcanic necks stand out as conical hills, and the interbedded sheets of Devonian or Carboniferous lava weather into conspicuous scarps. At Edinburgh the influence of the igneous masses is seen in the cliffed rock on which the castle stands, in the escarpment of Salisbury Craigs, and in the neck of Arthur's Seat, which dominates the city. Near Glasgow, the stronghold of Dumbarton was founded on another old volcano. The long escarpment of the Ochil Hills, facing north-west and continued on the Sidlaws east of Perth, is due to Devonian lava-flows, and Strathmore is a subsequent hollow at its foot, enlarged by the recession of the escarpment southward from the highland edge.

The river Forth draws its water from the Highlands, and its valley near Stirling was occupied by the sea in recent geological times. The vales or flat lands known in Scotland as 'carse' are typically illustrated in

the view from the igneous mass on which Stirling Castle stands. A carse may include estuarine beds, old peat-layers, and the terraces of raised beaches, resting on glacial boulder-clay, and represents a time when the country was some twenty-five feet nearer sea-level than it is now. Carse-features occur in the floor of the Tay valley, and, to take a southern example, in the wet pasture-lands below Dumfries in the estuary of the Nith (Pl. VIII).

The
Clyde.

The Clyde runs north-westward from the Southern Uplands, where it competes for head-waters with the Tweed, and it retains an immature character in the upper part of its valley, forming three fine falls near Lanark. Below Glasgow it enters the region of the long sea-inlets, and the Firth of Clyde gives ready access by steamer routes to the western highlands. At the same time it forms the natural entry to the lowlands from Liverpool or the Irish coast. The western boundary of the Firth, the high promontory of Kintyre, which is clearly visible from the Antrim plateaus, long ago attracted the hardy colonists who gave their name to Scotland. The coal-bearing strata with ironstone that cover a large area in the central lowlands have contributed to the prosperity of Edinburgh, Glasgow, and the Ayrshire coast.

The
Southern
Uplands.

The original drainage system of the Southern Uplands has no doubt been obscured by river-capture. H. J. Mackinder suggests that the Tweed at one time descended from the western highlands. Its valley still runs far back into the Uplands, and receives water near Broughton that comes down from the Hart Fell parallel with the Clyde. The Nith extends from the Solway Firth right across the axis into the Ayrshire lowlands, and its valley provides an easy route for road and rail (by the Glasgow and South-Western line) to Glasgow. The competition for routes has led the Caledonian Railway up Annandale to near Moffat and down the corresponding but opposite valley of the Clyde, across a divide 1,000 feet above the sea, where the possibilities of river-capture become clearly visible. The North British Railway leaves the Solway lowland by Liddisdale, tunnels the watershed,



PLATE VII (a). GLENCOE, SCOTLAND

(Phot. Professor Grenville Cole)



PLATE VII (b). GLENCOE, SCOTLAND

(Phot. W. Inglis Clark)



PLATE VIII. THE CARSE OF GOWRIE, FROM NEAR PERTH, SCOTLAND

(Phot. Wilson Brothers)

and drops into the Teviot-Tweed valley, with its rich woods and cultivated lands, at Hawick. The high road for Edinburgh, meanwhile, goes up the Ewes valley, and descends on the head of the Teviot at Moss-paul, in a narrow passage 800 feet above the sea, which is reached only twenty miles north of the Solway. Though the Tweed itself may have been beheaded by the system of the upper Clyde, yet its tributaries have in turn captured part of the waters that once ran north into the Central Lowlands.

The country at the head of the Solway Firth, with its well-farmed lands on Triassic rocks, presents a complete contrast with the dissected upland to the north. But this area is only a small inlet in a broad region of grassy and often stone-strewn moors, and it is no wonder that the frontiersmen found in cattle-raiding as well as cattle-raising a solution of their agricultural problems in by-gone days.

Surface Features of England

From the slope where the old Edinburgh coach-road crosses the Cheviot ridge at Carter Fell, we look south-ward across a bleak country, the scene of frequent conflicts between the Scottish and the English borderers. Numerous streams run across it to the Tyne; on the other side of the great valley rise the Cumberland moors, at the north end of the Pennine Chain. The southern branch of the Tyne descends from these hills, rising on a pass at 2,000 feet (600 metres) which leads over to the valley of the Tees. The northern branch of the Tyne originates on Carter Fell. The country has been well dissected, and the main valley of the Tyne, from Haltwhistle eastward to the sea, with its steep wooded banks and old-world villages, runs as a trench across the uplands. The Roman wall of Hadrian defended the north side of the vales of Irthing and of Tyne, and is partly built on the edge of an intrusive sheet of basalt, the scarp of which faces towards the border lands.

Northumbria.

On the east, the ground falls towards the synclinal

coal-field of Northumberland and Durham. This hilly country is cut into by the Wear, another river from the Pennine axis, which turns north-east along the syncline and provides, on its loop at Durham, one of the grandest town-sites in the British Isles.

West of this part of the Pennine axis, the Triassic and Permian sandstones form relatively rich land, where they are preserved in the long hollow of the Eden Valley. Beyond this rises the dissected dome of Silurian rocks which forms the Lake District, and is part of a concealed Caledonian range parallel with the Southern Uplands.

The Lake
District.

From the craggy masses about Scafell Pikes, 3,210 feet (978 metres), streams radiate, cutting deep but immature valleys through the mountains. Many of the valley floors have been converted into lakes, and the elongated form of Windermere is repeated in Coniston Water and Ullswater. Derwentwater and Bassenthwaite Lake, divided by the flat land at Keswick, are flooded expansions of the Derwent Valley, the head of which lies among the glaciated cliffs of Borrowdale. Climbing hence into a glacier basin above Seathwaite, we may descend steeply north again into a narrow valley that contains Buttermere and Crummock Water. The country, like North Wales, is becoming slowly modified after the effects of glacial erosion and the banking up of valleys by moraines. The present radial grouping of the valleys must date from the time when the cover of Carboniferous Limestone was stripped off the region (Plates IX; XXVI, b).

The
Pennine
Chain.

The symmetry of structure on both sides of the Pennine Chain is especially obvious near its southern end. The Triassic plain of the Lancashire coast is balanced by that from Nottingham to York. The deep valleys on the flanks of the chain are set with busy towns, which were once dependent on the strong streams from the moors, but are now well supplied with power from the coal beneath them. A pall of smoke floats between the sandstone edges, and blackens even the unproductive central uplands. Where the tributaries of the Trent have exposed the limestone in the Dale country at the

south end of the chain, enormous quarries and lime-kilns have been established on the valley sides. The upper country is largely a plateau, and the health resort of Buxton lies 1,000 feet above the sea. The dales are often bounded by vertical walls of limestone, and shelter a welcome growth of trees. The valleys of the Ouse and Trent run on the agricultural Triassic land on the east side of the chain, and the trend of the Jurassic scarp from Nottingham to the Cleveland Hills is clearly related to them. The Humber, in which these rivers meet, may be traced back into the Aire, an old consequent stream that has provided a route across to Settle under the highest summits of the chain. The present river-courses in the Cleveland Hills, and generally throughout eastern England, represent readjustments of drainage, which took place after the pre-Glacial valleys had been blocked by drift deposits or by ice.

The whole east coast of England, from the islets off The Bamburgh southwards, suffers from the attack of the North Sea, and a large part of it is formed of rocks that are easily worn away. The horizontal Jurassic beds of Whitby, the Cretaceous rocks from Filey to Spurn Head, and the boulder-clays and Pliocene sands of Norfolk and Suffolk, all exhibit signs of rapid waste. Some of the lost material is redeposited below the Humber mouth, and the level fenland of Cambridge and Lincoln has in part grown out against the sea. But even here the shallow waters of the Wash represent an incursion on the land. This eastern country, including the Jurassic escarpment, has been worn down to a low level, and the head-waters of some of the main streams lie in the Lias plain on the west side of the scarp. The main parts of the Welland and the Nene, and the whole of the Ouse of Huntingdon, run as sluggish rivers parallel with the escarpment of the Chalk. The short streams that reach the sea south-eastward from the low Cretaceous hills must be mere remnants, beheaded by the recession of the escarpment. The Fenland itself contains ground artificially reclaimed by drainage, and the system of canals resembles that of

Holland. The back of the Chalk in Norfolk is marked by small swelling hills; but the country is much covered by boulder-clay, and flint gravels affect the soil of considerable areas in East Anglia. Where the Cainozoic clays come to the surface, as in the London Basin, the soil is heavy, and only the nearness of the great city enables the land to be utilized over wide areas for market gardens. Rounded hills have been left here and there between numerous small meandering streams. The Bagshot Sands form level plateaus, covered with dense fir-woods, around Aldershot in the south-west of the basin. The long tidal inlet of the Thames, directed towards Europe, and sheltered by the Cretaceous promontory on the south, has allowed London to develop into the first port of the United Kingdom.

Eastern
coast-
lands of
the Eng-
lish
Channel:
the Weald.

The eastern counties of England, more than any other portion of the country, belong obviously to Europe. The shallow sea to eastward, the narrow wave-cut Straits of Dover, and the evidences of rapid wasting, all point to the recent date of the separation of England from the Continent. A certain amount of silting up and outward growth of the coast, however, has occurred between Winchelsea and Hythe.

West of the Straits of Dover stretches the inlier of the Weald, where the nature of the rocks has led to the retention of a large area of old forest. The central anticline of Hastings Sand and the bordering ranges of Lower Greensand support fir-woods; the stiff Weald Clay between these uplands is still in part thickly covered with oak-trees. The old consequent streams are sluggish and unimportant, now that their tributaries have removed so much of the original Cretaceous arch. The gaps through which they run south or north are of considerable interest, and show how the escarpments have been carved out since the course of the rivers was determined. The wearing back of these escarpments and the lowering of the Wealden area has caused many of the valleys on the Chalk surface to run dry, and here and there a gap, like that of Merstham, contains no river at the present day.



PLATE IX. THE LAKE DISTRICT OF ENGLAND.
 THIRLMERE, LOOKING UPWARD TO DUNMAIL RAISE.
 (b. GRASMERE AND RYDAL WATER
 • (Photo. G. J. R. Howarth)



PLATE X (a). STONEHENGE



PLATE X (b). VALLEY OF THE AVON NEAR BATH,
WITH CANAL CROSSING RIVER . .

(Pkots. Professor Grenville Cole)

The broad upland called Salisbury Plain is a representative portion of the Cretaceous plateau which once covered so much of western England. For the most part it produces little but short grass, on which sheep are grazed, the shepherds living out with them in movable huts on wheels. The villages are set in hollows of occasional streams, which go to feed the Wiltshire Avon. Numerous traces of former occupation are seen in the ring-camps and the tumuli on the rolling sky-lines, and the great temple of Stonehenge, the 'stones that hang', stands on a bleak slope above the wooded vale of Amesbury (Pl. X, a).

Salisbury Plain.

The Cotswold uplands are more largely tilled, but possess very stony soils. The Thames rises on them west of Cirencester, close to a stream that notches the escarpment deeply above Stroud and carries off water to the Severn. Numerous northern tributaries of the Thames must have suffered diminution during the development of the Severn valley, and the escarpment becomes very irregular in outline about the Liassic inlet of Moreton-in-the-Marsh. W. M. Davis has suggested that some of the grooves in the dip-slope may have been eroded by rivers from the melting ice of Glacial times. The yellow oolitic limestone has been quarried into cliffs along the edge of the fine Cotswold scarp, and the surface of the Lias below falls in a broad sweep towards the plain. Here the mediaeval towns are partly built of Cotswold stone, mingled with the half-timber work that is prevalent in the Triassic lowland. Justly famed examples of stone-built villages occur on the broad back of the Cotswolds, and the eighteenth-century city of Bath, where the valley of the Bristol Avon (Pl. X, b) has been cut far back into the hills, is one of the most consistent architectural monuments in Europe. Bath, however, owes its celebrity to the discovery by the Britons, and the embellishment by the Romans, of a spring with a temperature of 120° F. (49° C.), which is perhaps a relic of Cainozoic volcanic activity. The nearest lava, however, that can be reasonably connected with that era forms the Wolf Rock off Lizard Head (Pl. XVIII) in Cornwall.

The Cotswold Hills.

Devon
and
Cornwall.

The east of Devon, containing plateaus of Cretaceous sandstone in the Blackdown Hills, and a lowland of red Triassic and Permian strata, down which the easiest road from London reaches Exeter, repeats in a cramped space some features of the English midlands. But the country to the west is hilly, and is deeply grooved by the valleys of streams that descend swiftly from the central moors. These hollows shelter dense woods, and form the characteristic Devonshire 'combes'. Roads near the coast, even on the Permian conglomerates near Teignmouth, rise and fall on the notched edge of the land with such severity that walking is usually the most pleasant form of travel. The slaty rocks of the north coast produce rugged cliffs, the details of which are much influenced by the folding of the strata. From Hartland Point to Boscastle the coast is almost without shelter, and has been cut back smoothly by the Atlantic storms. On the promontory of Cornwall a few drowned valleys provide harbours. These are more important on the south side, and the sea penetrates from Falmouth up to Truro, and in Devon from Plymouth up the sunken floors of the Tamar and the Tavy almost to the fringe of Dartmoor. The whole of this region speaks of recent earth-movements. The cutting of the combes, following on a general elevation, has been to some extent checked by subsidence. The gravels that represent the epoch of melting of the northern ice-sheet were spread across the Scilly Isles, which then formed part of the mainland. Rocks, moreover, dredged from the English Channel, give us suggestions of lost landscapes that combined some of the features of Brittany with outliers of the Paris Basin.

The
Midlands.

The important watershed of central England lies in the Triassic plain near Birmingham, where the land rises frequently more than 500 feet (150 metres) above the sea. The more irregular ground in this area is due to the large inliers of Permian and Coal-Measure strata, two of which form the South Staffordshire and Warwickshire coal-fields. No contrast can be greater than that of the busy and smoke-darkened towns upon the hilly

Carboniferous surface, where rows of two-storied houses, dominated by mine chimneys and blast-furnaces, extend continuously for many miles, and the quiet fields and old red villages in the Triassic lands around.

Like the pottery towns north of Stafford, Birmingham has developed industries depending upon a cheap supply of fuel; but the city spreads over former agricultural land. From the Birmingham plateau streams run northward to the vale of Trent and southward to the Severn. The Warwickshire Avon, meandering in the Liassic and Triassic plain, is fed by streams from the face of the great Jurassic escarpment, which rises steeply beyond Stratford-on-Avon at Edge Hill. The Avon is subsequent in regard to the escarpment, and joins the Severn in the level fields of Tewkesbury. The Severn is generally held to be a composite river, and its precise history remains uncertain. It rises near Plynlimon in central Wales, and makes across Silurian uplands as if it would join the Dee. It bends eastwards towards Shrewsbury in open country, but then flows in a marked ravine across hard rocks from Ironbridge to Bridgenorth. Lower down, it again wanders in the broad red Triassic lands, past Worcester and Gloucester, to reach the sea-inlet in the narrower portion of its valley between the Cotswolds and the Forest of Dean.

Near Shrewsbury, the border country is diversified by the bold Silurian escarpment of Wenlock Edge, facing north-west, and by the conspicuous masses of pre-Cambrian igneous rock which form a broken ridge from Church Stretton to the Wrekin. The Wrekin, 1,320 feet (Pl. XII, a), rises like a volcano from the plain of Wellington. A similar projecting outlier of antique rocks has weathered out as a picturesque range from Abberley to Ledbury, the central portion forming the Malvern Hills. The boundary between Worcestershire and Herefordshire runs appropriately along the crest.

The Marches, the western borderland of England, ^{The Welsh} were won from the foothills that lead up to Wales. ^{Marches,} The Longmynd, a ridge of uptilted pre-Cambrian sandstones

and conglomerates, is the first true moorland on the western route from London. The long hollow between it and Wenlock Edge, occupied by a famous border roadway, is a 'through valley'; a stream runs northward along it from Church Stretton to the Severn near Shrewsbury, and another runs southward to the Teme, and so into the lower part of the Severn at Worcester. The Teme is one of the oldest consequent rivers from the Welsh uplands; it cuts across the Silurian rocks in a cliffed valley at Ludlow, and has trenched the Malvern and Abberley axis, forming the only passage through the chain.

Surface Features of Wales

North-east
Wales.

The topography of the north-eastern counties of Wales, especially towards the Cheshire plain, has been considerably modified by deposits of glacial drift, through which the rivers have now to find their way. The coal-field near Wrexham repeats the features of that in North Staffordshire, and on its west side Carboniferous Limestone forms characteristic scarps. The flat table of Great Ormes Head is a relic of the mass of Carboniferous Limestone that has now disappeared in the Irish Sea. The fertile hollow of the Vale of Clwyd is cut out in Triassic beds at the foot of the heather-covered Denbighshire moors.

Anglesey.

Anglesey consists of a series of ridges and hollows eroded along the Caledonian strike, the farm-houses being usually planted on the higher grounds. The hummocky surface of the island has been considerably lowered by the passage of the ice that once occupied the Irish Sea.

Snowdon.

The Snowdon region¹, as Sir A. Ramsay pointed out, presents the most convincing proofs of the former glaciation of our islands. In few places can moraines, perched blocks, and *roches moutonnées* be more easily studied; and the hard grey rhyolites of Ordovician age, split by frost action, but not rounded by the weather, yield striking cliffs on the hill-sides. Cirques have been hollowed out on the former dome-shaped mass of Snowdon,

leaving *arêtes* a few feet wide between their heads. Their ice-worn floors include small lakes. The fine range of resisting rocks from Conway to Tremadoc has been deeply dissected by streams from opposite sides, and Nant Francon, between the steep slopes of Carnedd Dafydd and the sheer crags of Tryfan and the Glyders, affords an easy passage for the famous Holyhead and Shrewsbury road.

The River Dee rises in the mountainous ground on the east of the Merionethshire pericline, where the headwaters of the Mawddach unite with it in forming a pass over to the sea. It descends into a pleasantly expanded and fertile valley, where it widens out as Bala Lake, and flows out of this as a full stream towards Corwen. It has entrenched a bold series of meanders deeply across the Denbighshire moorlands, and some of its present gorges in the picturesque Llangollen district have been regarded as of post-Glacial origin. Its pre-Glacial rock-channel between Bangor-on-Dee, east of Ruabon, and Chester lies well below sea-level. The present stream here runs over a level drift-covered country, and emerges on a wide estuary in low flat Triassic land at Connah's Quay. The Dee

The immense influence of the Welsh highlands upon western England is realized when we walk along the watershed that starts with the Berwyn Hills and thence forms the west border of Montgomeryshire. The great round-backed Silurian uplands, their glacial features smoothed over by grass-grown taluses of crumbling slate, feed a number of unfailing streams. In an artificial lake in the valley of Vyrnwy, Liverpool has secured a water-supply some 800 feet (245 metres) above the sea. The Severn and the Wye rise close together on Plynlimon. The Wye cuts an almost straight course towards the Black Mountains of Brecknock, its valley affording a much needed highway across the hills. North of Talgarth it pursues what appears to be a subsequent course, parallel with and inside the edge of the Old Red Sandstone, emerging near Hereford on the general lowland formed by the softer rocks of this system. The antiquity of this lower part of its course, however, is shown by the deep entrenching The Severn and the Wye.

BRITISH ISLES.

of its valley where it cuts the Carboniferous Limestone south of Monmouth. Here the river again follows the former slope of the country from north to south, and its valley floor has been greatly lowered and widened above Chepstow gorge. The Forest of Dean, a high synclinal outlier, capped by Coal Measures, on which part of the old English forest lingers, has been left between the valleys of the Severn and the Wye.

The Usk.

The Usk has worked its way back, generally along the Old Red Sandstone strike, until it threatens to behead streams that now supply the Towy. It flows eastward under the escarpment of the Brecon Beacons, 2,907 feet (886 metres), and pursues an old consequent and now, meandering course, right across the strike of the strata, from Abergavenny down to Newport. The dip-slope of the Brecon Beacons is grooved by numerous rapidly descending streams, which cut across the synclinal of the South Wales coal-field. Mining railways run up most of these narrow valleys, and a dense population lives along them. North of the coal-field rises the slope of the Old Red Sandstone moors, where the roads dwindle away into stepped and stone-strewn tracks, suitable only for horsemen or pedestrians. Horsemanship is often to be seen at markets in the quiet towns of Brecknockshire and Carmarthenshire, and the Towy valley leads us westward from the coal-field into a far more primitive land.

South
Wales.

The broad South Welsh field of anthracitic coal is conveniently cut by the sea in Swansea and Carmarthen bays, so that one of the greatest national assets in the British Isles is rendered accessible to shipping, and is at the same time largely drained to foreign lands. At the Towy and Taf inlets the coast-road is completed by two ferries. We then reach the plateau country of southwestern Wales, which terminates in a coast-line broken across the strike, reminding us of that of western Ireland. On the St. Davids promontory a number of pre-Cambrian rocks have come to light. The old ecclesiastical settlement stands here in a worn-down open country, almost as remote as Iona, against the western sea (Pl. XI).



PLATE XI. PENEPLAIN OF SOUTHWEST WALES, CAERBWDY BAY,
PEMBROKESHIRE

(Photo. Mr. E. W. Tindridge, per Geological Association)



PLATE XII (a). THE WREKIN, SHROPSHIRE



PLATE XII (b). COAST OF CO. WICKLOW, IRELAND.
QUARTZITE CONE OF GREAT SUGARLOAF TO RIGHT
(Phots. Professor Grenville Cole)

PHYSICAL FEATURES

Surface Features of Ireland

The traveller approaching the coast of Ireland is ^{The hilly} impressed by the hilly nature of its margins. As he passes ^{margin.} up St. George's Channel the long granite chain of Leinster, with its picturesque foothills, lies upon his left (Pl. XII, *b*). After he has left Dublin for the north, the gabbro ridge of Carlingford and the serrated outline of the Mourne Mountains, culminating in Slieve Donard, the seaward summit, juts out beyond Dundalk Bay. At Belfast Lough he comes under the grim wall of basalt that can be followed almost continuously to Lough Foyle. The Dalradian hills of Donegal terminate on the west in the quartzite cliffs of Slieve League, 1,972 feet (601 metres), the highest in the British Isles. At Sligo the limestone crags on Ben Bulbin are close at hand, and the range of the Ox Mountains is already visible in the south. Cliffs, mostly of quartzite, indicate the truncation of the high-land mass of Mayo by the Atlantic (Pl. XVI, *b*), and the highest point of Achill Island, 2,200 feet, rises almost vertically above the water. The inlet of Clew Bay is hemmed about by mountains. At Killary Harbour Mulreea, 2,688 feet (819 metres), with its fine glacial cirques, and the quartzite cones of Connemara¹, stand about the quiet fiord. The high ridges of Old Red Sandstone form the promontories of Kerry and south-western Cork. Beginning with Brandon Hill in the Dingle promontory, 3,127 feet (953 metres), summit after summit stands out close to the Atlantic, and the Boggeragh and the Knockmealdown Mountains bar us from the interior as we journey round by Cork and Dungarvan to the east.

The interior of Ireland, however, is remarkably free ^{The} from irregularities, and the limestone plain occupies about ^{central} half the country. The north shore of Galway Bay¹, where the granite and the schistose rocks are cut off sharply along a line running east and west, is strongly suggestive of a fault, and its continuation eastward may have influenced the settling down of the limestone in a broadly synclinal form. The limestone, dipping gently northwards

¹ Plate XXIX.

from the slopes of the Slieve Aughty and Slieve Bloom Mountains, stretches away to the Newry axis and the Curlew Hills, in a plain that rarely rises 400 feet (120 metres) above the sea. During the Ice Age, this lowland was the meeting-ground of confluent glaciers from the hills. On the east, moreover, through the gap where it reaches the sea between Dundalk Bay and Kingstown, it was for a time invaded by ice that occupied the Irish Sea. When this ice shrank away, it left boulder-clays and gravels washed from them, which contain numerous marine shells. During a return of glacial conditions, the Irish ice spread unhindered to the margins of the plain, on which it long rested as a stagnating sheet. The corries in the mountains, converted into cirques by frost-action, nurtured local glaciers that sent down boulders into the lowlands, and these hollows are probably among the youngest features produced by glacial erosion in Ireland.

Glacia-
tion;
drumlins
and
eskers.

This late stage of the Glacial epoch is that which concerns the features of the plain to-day. Almost everywhere, as the stagnating ice-sheet melted, a thick layer of boulder-clay was left behind. In many places limestone boulders, imported from the plain, ameliorate stiff-clay lands on Silurian slate. The region of precipitation from which the ice mainly descended during the first epoch of glaciation was a band of country running north-eastward from the heart of Sligo, and near this the boulder-clay is grouped in the round-backed elongated hills for which the Irish name 'drumlins'¹ was reserved by Maxwell Close. Parts of Cavan and Monaghan are, as it were, strewn with drumlins, which are often cultivated up to their crests. Out in the plains, the courses of streams beneath the stagnating ice are recorded by eskers, ridges of gravel that frequently form the only prominent features in the landscape. They are covered with grass, and run like walls across the country, roads being often carried along their crests on account of the dry routes thus obtained.

Peat.

During the damper centuries of post-Glacial times, peat² accumulated over hill and plain alike; to-day, under

¹ Plate XIII, a.

² Plate XIII, b.

drier conditions, it is cracking asunder on the hills, and is being removed rapidly by the wind. But like the ice of earlier times it remains stagnating on much of the central plain, and the brown peat-bogs, with here and there a green esker rising between them, are a striking feature of the traverse between Dublin and Galway.

The central plain bears numerous lakes, which are mostly expansions of the rivers. The immense stretch of limestone, and the acid nature of peaty waters, enable the streams to widen their courses by solution. Lough Oughter and Upper Lough Erne are obviously due to meandering streams. The course of the Shannon includes Loughs Bofin and Forbes and the broad expansion of Lough Ree. Between Tullamore and Woodlawn in Galway, the Shannon valley may be regarded as 40 miles (64 kilometres) wide. The north end of Lough Derg near Portumna is also a flooded portion of the plain. Lough Leane, at Killarney, and Loughs Corrib and Mask, at the foot of the Connemara hills, belong to the limestone area, and are strikingly contrasted with the narrower lakes in the deeply-cut valleys of the highlands.

The Aran islands in Galway Bay are mere limestone shelves surviving from the invasion of the sea into the plain. To the south-east of the lower part of the Shannon, anticlines of Old Red Sandstone become more frequent, and the plain country merges into a region of rapid scenic contrasts.

The absence of any marked watershed between east and west in Ireland is seen in the courses of the Shannon and the Suck. The breaching of the Old Red Sandstone barrier by the former at Killaloe in its course southwards indicates that the river originated on a surface with a southerly slope, equally with the rivers Barrow and Nore. Though the denuding forces proceeded to erode this surface during its uplift, yet the elevating forces prevailed, and we may well conclude that the rivers marked out their original routes on a surface some 1,500 feet higher than that on which they at present run. The trenching of the granite of the Leinster Chain by the Barrow, between

Brandon Hill and Blackstairs Mountain, is even more remarkable than the Shannon gap at Killaloe.

Among the rivers that now essentially belong to the lowland, the Shannon still rises on an irregular upland of Milestone Grit and Coal Measures. Round Lough Allen we thus have a residual picture of the country over which the streams first found their way. The outlier of the Kilkenny coal-field, between the Barrow and the Nore, provides additional evidence as to this surface. The plain, as a great geographical feature, did not come into existence until denudation reached down to the Carboniferous Limestone.

History
of river
courses.

Though the courses of the Irish rivers must, then, in general, be explained by reference to a very remote land-surface, many of their details are due to modifications brought about in glacial times. Where streams, such as the Dodder and the Liffey near Dublin, have cut through boulder-clay in the plain, exposing the floor of rock below, it is extremely improbable that they have recovered the valleys that they occupied before the arrival of the ice. Dry gaps in many parts of the country indicate a system of drainage that was set up temporarily when melting of the ice was in excess of the precipitation of snow, and this river-system arose on a domed surface of ice that was less dependent on the form of the land below than was the case either in Scotland or in England. The present geographical features of the Irish plain and of its borders cannot be dissociated from the history of the Glacial epoch.

The
Leinster
Chain.

The south end of the Leinster Chain, as mentioned above, is trenched by the River Barrow. The Slaney similarly cuts right across it in a southward course, from Baltinglass to Enniscorthy, and doubtless arose on a cover of rocks that concealed a large part of the granite. The ridges of the foothills on either side of the core indicate the prevalent Caledonian strike, and the trend of the strata has influenced the course of the Liffey valley between Kilbride and Pollaphuca, and of the southern Bann from near Aughrim to its junction with the Slaney.



PLATE XIII (a). DRUMLIN BELOW CARBONIFEROUS LIMESTONE
SLOPE, KESH, CO. SLIGO, IRELAND



PLATE XIII (b). PEAT-BOG AND TRACES OF FORMER FOREST,
NEAR BALLYMENA, CO. ANTRIM, IRELAND

(Phot. Professor Greville Cole)



PLATE XIV (a). WATERFALL OF DARGLE RIVER,
POWERSCOURT, CO. WICKLOW, IRELAND. AT JUNCTION
OF GRANITE AND MICA-SCHIST



PLATE XIV (b). LOWLAND NEAR DUBLIN, FROM THE
LEINSTER CHAIN, IRELAND
(Phot. Professor Grenville Cole)

Between Bray and Wicklow the Cambrian quartzites provide picturesque hill-crests; the cone of the great Sugarloaf, 1,659 feet (506 metres), a relic of the escarpment of an eastward-dipping bed, dominates the landscape south of Kingstown. The quartzite ridge of Carrick Mountain is conspicuous west of Wicklow. The region of similar strata near Wexford town is marked by a band of craggy bluffs known as the Mountains of Forth. The streams rising on the granite moorland have cut ravines in the foothills like those of the Dargle and of the Devil's Glen, at the head of which are waterfalls, showing that erosion is still active (Pl. XIV, a). Signs of pre-Glacial overdeepening in the strike-valley of the Oyoca and elsewhere suggest that a good deal of gorge-cutting in the foothills is connected with an uplift in late Tertiary times. The ravine of the Liffey at Pollaphuca is, however, post-Glacial. More mature features are found on the uplands, where the narrow valleys widen out into the great basins that are characteristic of the granite, and a step often occurs at the junction of the granite and the schist. The most characteristic landscape of the chain is at Glendalough¹, in the heart of Wicklow, where two moraine-dammed lakes lie between steep walls of schist. Glacial action has here kept the valley sides almost vertical, and the bed of an ice-fall at the head of the upper lake leads up to a broad corrie on the granite. The glens stretching into the hills have always been a refuge for those who fled from the settled order of the limestone plain². The hill-men, O'Byrnes and O'Tooles, were for centuries a menace to Dublin, and the Leinster Chain was never conquered until the great military road was carried over the glen-heads, from Dublin to the Aughrim, after 1798.

The northern river Bann rises among the rock-strewn slopes and granite crags on the west side of the Mourne Mountains, and, like the Shannon, drops rapidly towards its base-level. It notches the Newry axis and emerges on a plain near Portadown. The broad waters of Lough Neagh, which here receive it, lie only 48 feet (15 metres)

Lough
Neagh
and the
Bann.

¹ Plate XXVIII.

² Plate XIV, b.

above the sea. The lake³basin has been formed by the lowering of the Antrim basalts by a series of faults. On the east, these basalts rise towards their scarp^d uplands on the coast of Belfast Lough, in broad inclined plateaus that are heather-covered as they reach heights of 1,000 feet or more. On the west they form smaller scarps facing the pre-Cambrian moorland of Tyrone, but rise to 1,536 feet (468 metres) on Benbradagh and 1,260 feet (384 metres) on Benevenagh above Lough Foyle.

The
Donegal
Highlands.

Lough Foyle has been shaped by denudation, accompanied by subsidence, from a broad synclinal of soft Carboniferous Sandstone. Lough Swilly and the Mulroy inlet on the west introduce us, however, to narrow drowned valleys like those of south-west Scotland. Ridges produced by folding of rocks of differing hardness have to be traversed one after another as we penetrate the county of Donegal. The mica-schist country furnishes lands that are fairly fertile, when not raised too high on mountain-sides. The quartzites weather out in barren ribs, from which white taluses stream down; they form the long ridge of Muckish, conspicuous on the northern coast, the craggy cone of Errigal, and the ice-worn crest of Aghla near Lough Finn. The north-western half of the county, however, consists largely of granite, and the bare glaciated surfaces are cumbered with erratic blocks. Any hollows where glacial drift has lingered are eagerly seized on for small holdings. The wind piles up great sand-dunes along the coast on the flats provided by raised beaches, in contrast with the purple hills beyond. Passing south to Donegal town, we reach a pleasant and wooded sea-inlet on Carboniferous strata, and at Bundoran we stand on the north-west margin of the central plain of Ireland.

The south-
west.

When limestone covered the whole south of Ireland, the rapid repetition of anticline and syncline on a considerable scale no doubt gave rise to scarp^d hills and ravines like those among the Juras, and 'cluses' were cut out along the strike, in addition to the valleys main-



PLATE XV. UPPER LAKE OF KILLARNEY AND MAGILLICUDDY'S REEKS, S.W. IRELAND

Photo. R. W. Bailey



PLATE XVI (a). GLACIATED OLD RED SANDSTONE, WEST OF
KILLARNEY, CO. KERRY, IRELAND
(Phot. Professor Grenville Cole)



PLATE XVI (b). NORTH COAST, CO. MAYO, IRELAND
(Phot. O. J. R. Howarth)

tained by the first consequent streams down the general southward slope of the upraised area. When the Old Red Sandstone anticlines began to be exposed, this rectangular system of streams became rapidly emphasized. The consequent rivers maintained their courses, and the differing nature of the rocks promoted narrow valleys across the sandstone anticlines and wider ones in the limestone areas that lay between. The subsequent tributaries, spreading westward up the strike, became localized in the synclinal bands of limestone, in which they lowered their floors as the transverse gorges deepened. The more powerful ones among them soon beheaded certain of the consequent streams, while they captured former head-waters which came in from the north. In this way the main portions of the Suir, the Blackwater, and the Lee consist of subsequent streams, and their lower portions represent the primary and consequent drainage. This feature attracted J. B. Jukes in 1862, and his memorable paper laid the foundation for numerous studies in river-capture. The occurrence of a peneplain, Juke's plain of marine denudation, somewhat below the crest-level of the Old Red Sandstone ridges, indicates that the progress of denudation has been assisted by at least two movements of elevation, the latter of which is probably connected with the Alpine uplift of the Britannic region.

In western Kerry glaciated surfaces of Old Red Sandstone jut out through the moor (Pl. XVI, a), and bold terraced rocks rise on the higher levels of the hills. From Cahirciveen to the great cirque of Cúmshingaun, on the eastern face of the Comeraghs, features due to glacial erosion are conspicuous. In the synclinal hollows of Carboniferous Limestone drift and clay soils prevail; rich vegetation gathers in consequence along the river banks. Here and there, as we look down from one of the sandstone ridges, alluvial fans of sand may be seen, encroaching on the fertile lowlands. The greater part of the uplands is barren, and there are no natural passages from north to south across the country. The drowned valleys,



FIG. 4. Glaciation of the British Isles (Prof. E. J. Garwood).

however, help in affording access to the interior from the coast. Those of the west, forming typical open-mouthed rias, lie in synclinals floored by limestone or Carboniferous Slate, and are thus repetitions on a narrower scale of Galway, Clew, and Donegal bays. Throughout the whole south-west the landscapes are controlled by the unequal resistance to erosion of the Carboniferous rocks and of the Old Red Sandstone.

[For topographical references and studies see J. P. Anderson, *Book of British Topography*, London, 1881, and W. V. Daniell and F. J. Nield, *graphy. Manual of British Topography*, London, 1909; also 'Geographical Literature of the Month' in the *Geographical Journal*, London, Roy. Geog. Soc., and the papers in the *Journal* itself by H. R. Mill (vols. xv, xxiv), G. G. Chisholm (vols. ix, x), and others. For geology, see maps and *Memoirs of the Geological Surveys of Great Britain* (London) and *Ireland* (Dublin); among the memoirs of wider scope may be mentioned C. Reid, *Pliocene Deposits of Britain* (1890); C. Fox-Strangways and H. B. Woodward, *Jurassic Rocks of Britain* (1892-5); B. N. Peach and J. Horne, *Silurian Rocks of Britain* (1899 seqq.); A. J. Jukes-Brown and W. Hill, *Cretaceous Rocks of Britain* (1900 seqq.). See also A. McHenry and W. W. Watts, *Guide to the Collection of Rocks and Fossils, Geological Survey of Ireland*, Dublin, 1898; Lord Avebury, *The Scenery of England and the Causes to which it is Due*, London, 1904; Sir A. Geikie, *The Scenery of Scotland, Reviewed in Connection with its Physical Geology*, London, 1901; W. J. Harrison, *Geology of the Counties of Wales*, London, 1882; E. Hull, *Physical Geology and Geography of Ireland*, London, 1891; H. J. Mackinder, *Britain and the British Seas*, Oxford, 1907; P. Macnair, *Geology and Scenery of the Grampians and the Valley of Strathmore*, Glasgow, 1908; Sir A. C. Ramsay, *Physical Geography and Geology of Great Britain*, London, 1894; H. B. Woodward, *The Geology of England and Wales*, London, 1887. Not only topography and geology, but also flora, fauna, economic conditions, archaeology, &c., are treated in the *Victoria County Histories* (England: London, 1900 seqq.).

The work and maps of the Ordnance Survey are fully discussed in the general volume (VI) of this series. There are several good series of maps by different cartographical firms: Bartholomew's Survey Atlases of England and Wales and Scotland may be mentioned, and the same firm has issued maps in similar style for Ireland also.]

CHAPTER II

CLIMATE

BY W. G. KENDREW

1. *The Influence of the Position of Britain*

Latitudinal position.

THE British Isles lie between 50° and 61° N.—roughly the same latitudes as Central and Southern Russia and Siberia, British Columbia, the Central Provinces of Canada, and Labrador.

Altitude of the sun.

The altitude of the sun at noon at Lerwick in the Shetlands varies from $6\frac{1}{2}^{\circ}$ at midwinter to $53\frac{1}{2}^{\circ}$ at midsummer, and at London from 15° at midwinter to 62° at midsummer. At Lerwick the sun is above the horizon for $5\frac{1}{4}$ hours on midwinter day, $18\frac{3}{4}$ hours on midsummer day; at London for $7\frac{3}{4}$ and $16\frac{1}{2}$ hours. Consequently, there are well-marked seasonal differences of climate.

Britain lies to the west of the largest land-mass of the earth, a land-mass, however, much broken up by inland seas opposite our islands. The Straits of Dover are only 21 miles wide, but the North Sea averages about 300 miles.

Influence of the Atlantic.

The British Isles are to be considered even more as an archipelago rising in the east of the North Atlantic, the shape of which is the cause of some of the marked peculiarities of our climate. It is possible to travel to the south-west for about 4,000 miles in a direct line over unbroken ocean; on the west 2,000 miles of water separate us from the bleakness of Labrador; northward no land intervenes between us and the Arctic Ocean. The prevalent winds almost all the year are south-west and west; we therefore share the moist equable conditions of the ocean, and continental extremes of cold never appear in an intense form.

The North Atlantic is the most remarkable of the oceans in its temperature conditions. A mighty current of

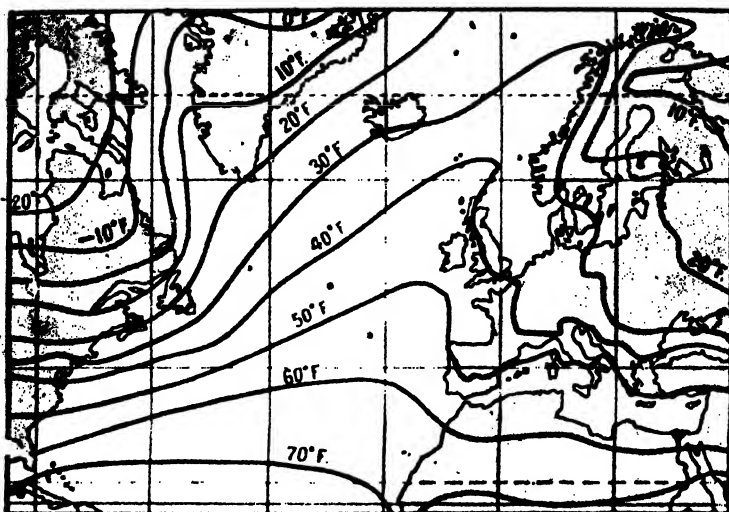


FIG. 5. Isotherms for January over the North Atlantic.

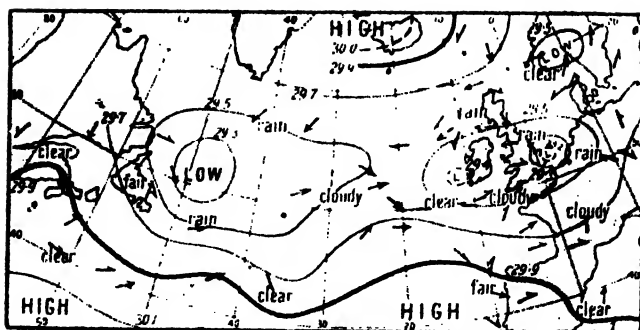


FIG. 6. Irregularities of Pressure over the North Atlantic.

relatively warm water, the Gulf Stream, flows from its south-western parts towards the north-east. As a current this almost dies out even before reaching mid-Atlantic, but a vast volume of warm water is drifted onward by the south-west winds about eight or nine miles in a day, and spreads as a warm surface-layer over the eastern part of the North Atlantic in which Britain is set. Its effect on the air temperature is especially beneficent in winter (Fig. 5), and the gulf of warmth that projects at this season far into the polar night of the Arctic is a feature unique on the globe. While the east coast of America in the same latitude is fringed by a barrier of pack-ice and icebergs reaching miles out to sea, even the most land-locked recesses of the Scottish fiords are but rarely thinly frozen over, and icebergs are never seen within hundreds of miles of the British coasts. The climatic advantages enjoyed by Britain owing to the North Atlantic Drift are such that the mean January temperature of the air west of and over our islands is as much as 30° higher than the mean temperature of the latitude for the whole of the northern hemisphere. (Cf. p. 128.)

In summer ocean winds usually cool the coasts to which they blow, and this is so in Western Europe; but the peculiar conditions of the Atlantic make Britain warmer in summer than other west coasts at the same distance from the equator.

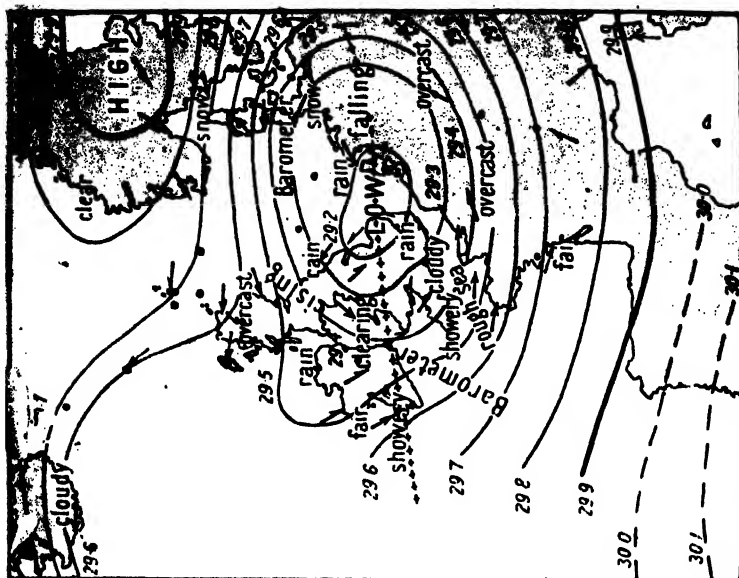
Sea surface temperatures.

The mean temperature of the sea surface is as follows :

	<i>Feb.</i>	<i>May.</i>	<i>Aug.</i>	<i>Nov.</i>	<i>Year.</i>
Off Scilly Islands	48° F.	54° F.	61° F.	54° F.	54° F.
Off west coast of Ireland .	48	54	59	49	52
Off Cape Wrath	41	49	55	49	48
Off east coast of Great Britain	40	49	57	48	48

Pressure systems affecting British climate.

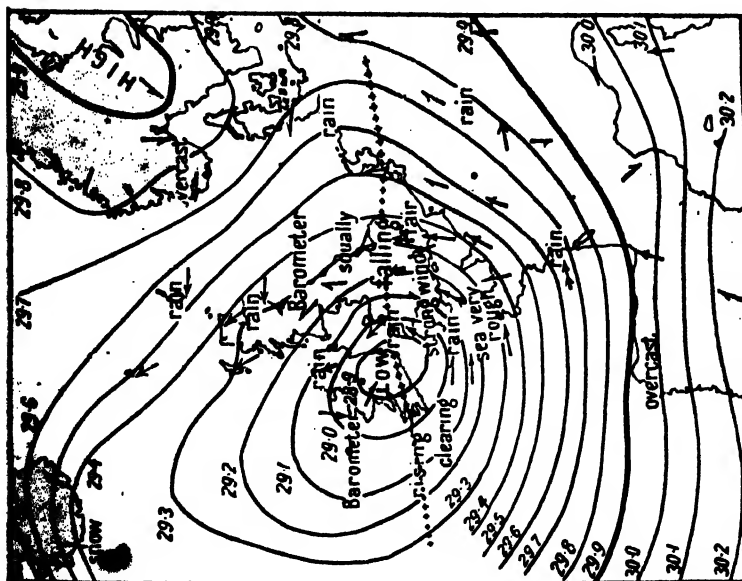
It remains to consider the atmospheric environment of the British Isles. To the south-west the atmospheric pressure is almost always relatively high in the 'North Atlantic Anticyclone', situated in mid-ocean from about 23° to 40° N. ; this is a region of calms or light winds, and on the whole fine mild dry weather. Very different are the conditions over the north of the North Atlantic. In a long trough extending from Baffin Bay over Cape Farewell,



8.

Weather as controlled by a moving Cyclone.

FIG



Iceland, the Faeroes, and far to the north-east beyond the North Cape of Norway, pressure is low, especially in winter, and travelling or stationary depressions are almost always present, causing the mild but rainy and stormy weather for which the southern part of the region is noted. Stormy at all seasons, in winter this is one of the wildest tracts on the earth, for though the hurricanes of the West Indies may give stronger winds for short periods, nowhere else, save in similar latitudes in the Southern Hemisphere, do we find the almost continuous winter gales that dominate the ocean between New York, western Europe, and Iceland. A third climatic region is continental Europe to the south-east of the British Isles, a region of high pressure in winter. The range of temperature is considerable; the summers are warm, the winters calm, dry, and very cold, even the Rhine being frozen nearly every winter.

As regards the mean distribution of pressure in January, April, July, and October, the conditions are approximately the same at all seasons so far as the British Isles are concerned, and they give us south-west winds in winter and west winds in summer (see Fig. 6).

The great pressure systems, however, the 'centres of action' of the Azores, Iceland, and Eurasia, are not absolutely constant in position or intensity even during a single season. Sometimes the Azores High spreads to the north-east and dominates the weather of the British Isles, sometimes the Iceland Low encloses us within its stormy influence, sometimes the European conditions extend to the north-west. Since we are situated on the boundary of these very different regions a very small change in the surrounding distribution of pressure may effect a very sudden and great change in our weather. Within a few hours calm, clear, frosty air may give place to a gale from the south-west, cloudy skies, much rain, and comparative warmth. These changes will now be described in more detail.

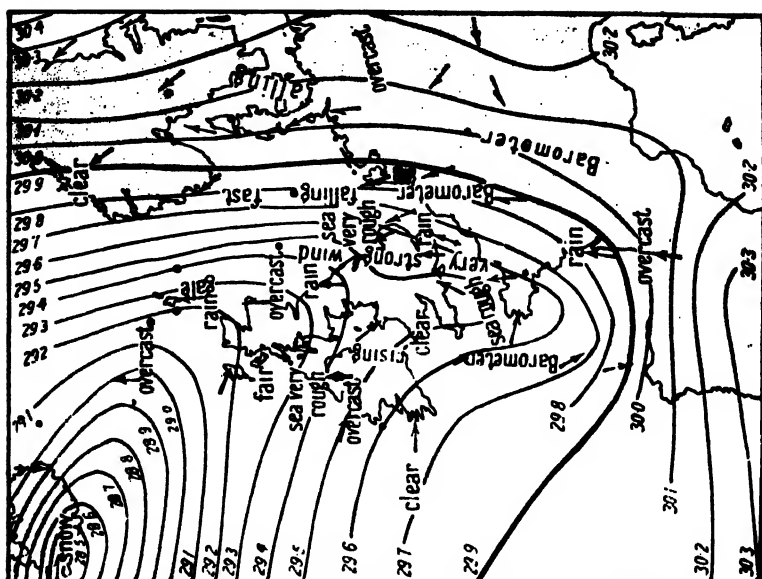


FIG. 10. A V-shaped Depression.

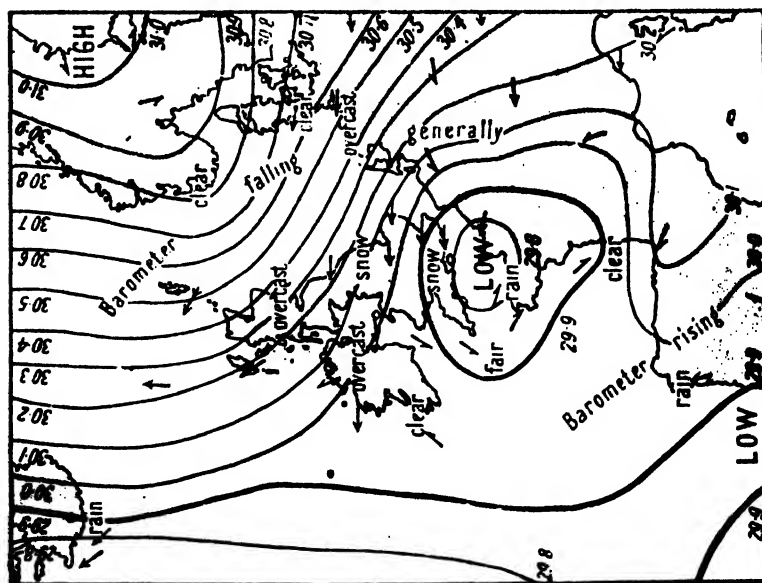


FIG. 9. Distribution of Pressure causing Cold Winds and Snow.

2. *Pressure-types, Weather, and Seasons*

Varying
distribu-
tion of
pressure.

The climate of the British Isles is very equable, yet the weather is decidedly changeable, and the gradient seen on the maps of mean pressure is merely the resultant of a constantly varying distribution. Even when the great centres of action just mentioned occupy approximately their usual position the vast westerly current of air in which our islands lie is interrupted by frequent swirls, eddies, as it were, in the atmospheric stream; now pressure is relatively high, now low. Our weather changes are due to these eddies, of which there are usually one or more over the North Atlantic region moving from west to east (Fig. 6).

Isobars of almost every shape are found in our daily weather-charts, and reveal the infinite variety of the surface conditions of the atmosphere, but there are certain typical forms, each with its own weather, some of which we shall examine.

Low-
pressure
types.

The main distinction is between low- and high-pressure types. Of low-pressure systems a common form is the circular depression or cyclone. The region affected is sometimes as much as 1,000 miles across. The wind is blowing inwards on all sides, but is deflected considerably to the right hand. The same air does not circle completely round the disturbance; hence the southerly winds in front are markedly warmer than the polar indraught in the rear, and, in general, the front is the rainy side, the rear has clearing and fair skies, and often stronger winds.

The southern part of the British Isles is usually well to the south of the centre of passing cyclones, and so does not experience the complete change of wind that occurs at any station exactly on the path, but merely a veering from south-east through south to south-west or west (Figs. 7, 8). When the depression passes on the south of the observer, as is often the case in the north of Scotland, the wind backs from east through north-east to north and north-west. These polar winds bring a low temperature, and in winter and spring, when a depression

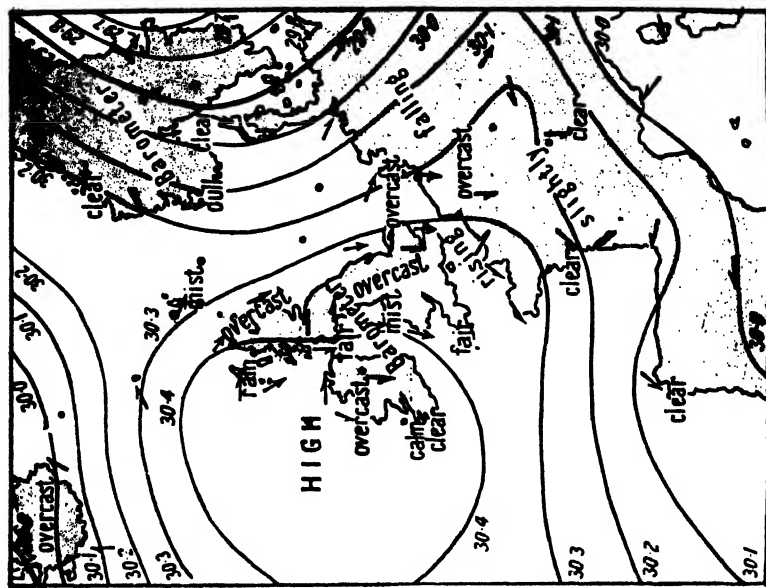


Fig. 12. An Anticyclone with Overcast Skies.

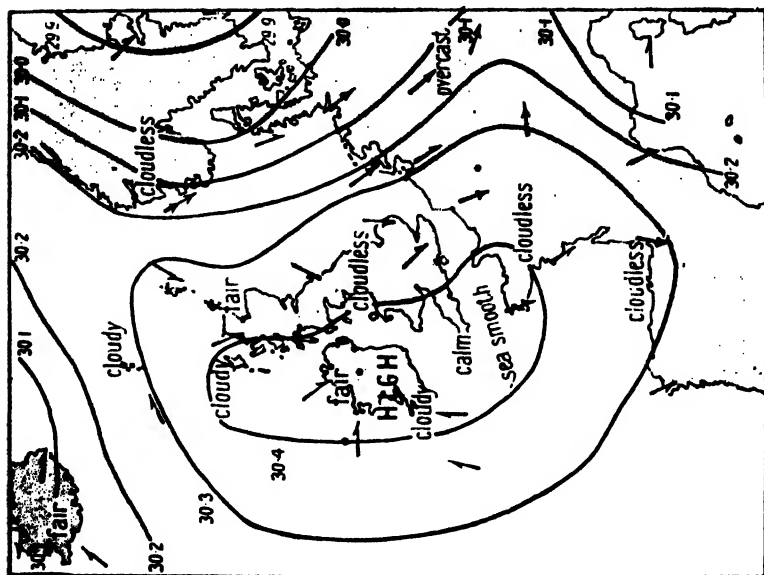


Fig. 11. An Anticyclone with Clear Skies.

lies over the English Channel, as in Fig. 11, there is wild wintry weather, and often much snow, over the whole country. The force of the wind varies, according to the closeness of the isobars, from a light breeze to storms of the greatest fury, gusts at a rate of 100 miles an hour being sometimes recorded on the coasts.

The symmetry of the isobars round a depression may be broken by irregularities enclosing 'secondary' disturbances, which are sometimes quite slight, sometimes deeper than the principal disturbance. Even when slight these secondary depressions may cause very unsettled weather and copious rain, and they are a frequent source of thunderstorms in summer. A special form of secondary is the V-shaped depression (Fig. 10), which frequently has very steep gradients, with violent winds, in a long narrow belt parallel to its length. These line-squalls, as they are called, often work havoc on land and sea as the V sweeps across, accompanied by thunderstorms and hail. The temperature drops abruptly with the change of wind as the trough passes.

High-
pressure
types :
anti-
cyclones ;

High-pressure systems, which usually give us fine weather, are of two well-defined forms. Firstly, there are anticyclones, extensive systems which either slowly spread over our islands or are developed there. In the centre, where it is almost calm, pressure may be above 31 inches. The winds blow spirally outward, but attain no great force; heavy winds and rain are conspicuously absent; but with this reservation, the weather is often very variable. We hope for clear skies with high pressures (Fig. 11), but only too often they are clouded, sometimes completely overcast, and light rain may fall (Fig. 12).

in winter,

In winter, anticyclones, when accompanied by clear skies, sometimes bring us our greatest cold, and almost always a considerable lowering of the temperature, owing to the chilling of the calm air by radiation from the ground, for during the long winter nights radiation lowers the temperature much more than it can be raised by the few hours' feeble sunshine. Hence, in winter a high barometer is often associated with a low thermometer. Even apart

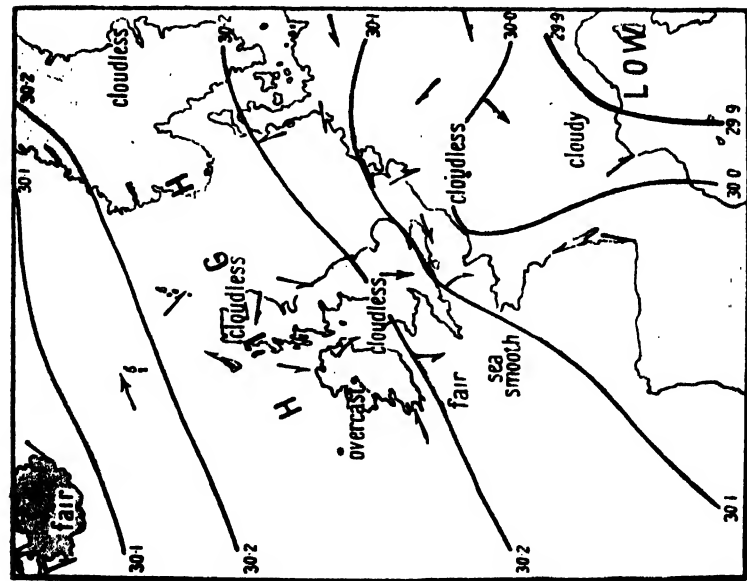


FIG. 14. A Wedge of High Pressure moving across the British Isles: in front, weather fine and sky clear; in rear, cloudy and raining.

FIG. 13. An Anticyclone causing abnormal Heat in Summer.

from anticyclones, the temperature often falls as the barometer rises and vice versa, for since depressions usually pass north of us, their approach, signalled by the falling barometer, gives warm southerly winds, and their departure cool polar winds as the barometer rises again (Fig. 15).

in summer,

In summer the direct rays of the sun exert the most effective control on temperature, and an anticyclone with clear skies gives excessive heat by day, but the short nights are cool or even cold, with heavy dew, and hence the diurnal range of temperature is great. Our hottest summers are those in which the high pressures, generally situated to the south-west and south-east, extend persistently over us. This was the case in August 1911, one of the hottest months on record (Fig. 13).

in autumn.

In autumn anticyclones almost always give fog, for the air tends to be damp at this season, and radiation soon chills it to dew-point. In spring the air is dry, since the temperature of the sea is only beginning to rise, while the land is already being rapidly warmed by the sun. Anticyclones are often centred to the north of us in spring and the east winds that sweep the country are often very dry.

The south-east of England enjoys anticyclonic conditions more frequently than the rest of the British Isles, a circumstance which partly explains its colder winters and warmer summers.

Anticyclones are usually slow in movement and erratic in course. Sometimes a separate system moves over us, but more often our high pressures are due merely to an extension, not a translation, of those of Europe or the Azores, as in the remarkably cold winter of 1879 (see Bartholomew and Herbertson, *Atlas of Meteorology*, Plate 31).

The wedge and the col.

The other high-pressure type is the 'wedge', which often separates two depressions and moves on with them. The weather is usually remarkably fine on its front, but in the rear the influence of the advancing cyclone is felt, and halos and clouds give promise of the coming bad weather. The change from clouds, rain, and muggy weather to

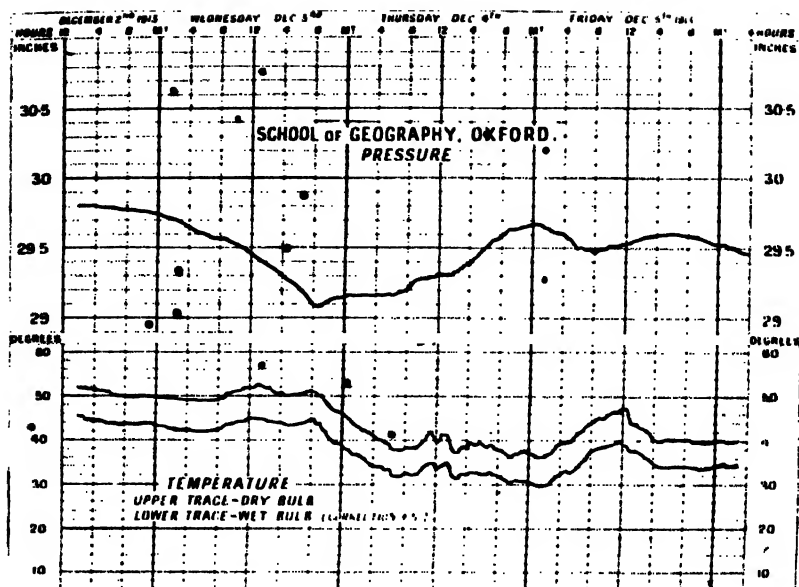


FIG. 15. Barograph and Thermograph traces, showing a usual connexion between changes of Pressure and Temperature in Winter.

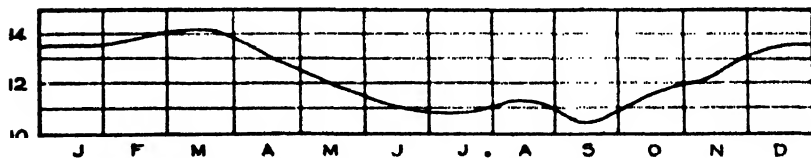


FIG. 16. Mean Force of Wind in each Month (at Oxford).

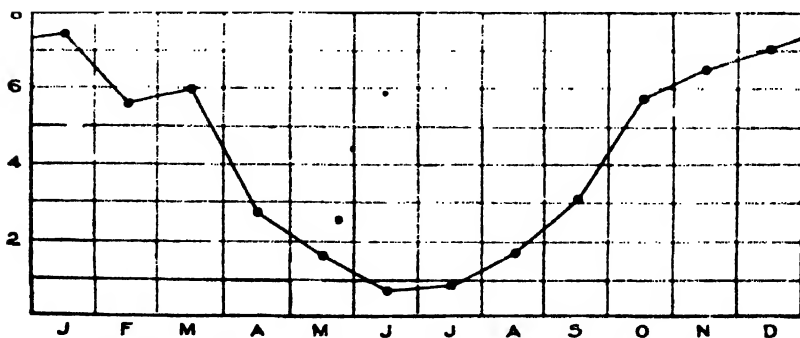


FIG. 17. Average Number of Gales in each Month (all coasts).

brilliant skies and clear fresh air, and back again to rain, all within a few hours, is most striking (Fig. 14). Between two anticyclones we have the converse formation, a 'col' of low pressure, with cloudy skies and sometimes thunderstorms in summer.

Weather
fore-
casting.

Obviously the study of weather resolves itself into that of the distribution of pressure. The weather associated with the typical isobar forms is known, and if we knew exactly when and where any type of isobar would appear, and what track it would follow, weather forecasting would be easy. Unfortunately we do not, and to add to the difficulty weather-systems often change their form, speed, and course as they travel along: depressions may deepen or fill up, or develop secondaries, and we have no certain means of knowing what will happen. The general principles are understood, but not in sufficient detail for confident application to any particular instance. Moreover, our weather usually arrives from the Atlantic, whence wireless weather reports are few.

Depressions are far deeper and more numerous in autumn and winter than in spring and summer. Angot gives the mean monthly percentage of the whole in mid-Atlantic between latitudes 45° and 60° N. as follows: January 20%, February 17%, March 11%, April 5%, May 2%, June 2%, July 2%, August 3%, September 2%, October 6%, November 13%, December 17%. Hence gales are rarest in summer, when a very deep cyclone is very exceptional. Brodie¹ states that the mean number of gales (i.e. winds exceeding 40 miles per hour) per month for 1871-1900 was: January 7.4, February 5.5, March 5.9, April 2.7, May 1.6, June 0.7, July 0.8, August 1.7, September 3.1, October 5.7, November 6.5, December 7.0; year 48.6.

Cyclones move more rapidly in winter than in summer. The speed is very variable, on the average of the year about sixteen miles an hour; the shallow depressions of summer often move very slowly and erratically.

January is the typical winter month. The main feature of the mean pressure distribution is the deep and extensive depression around Iceland, the region of numerous cyclones which sometimes travel rapidly, some-

The seasons:
Winter.

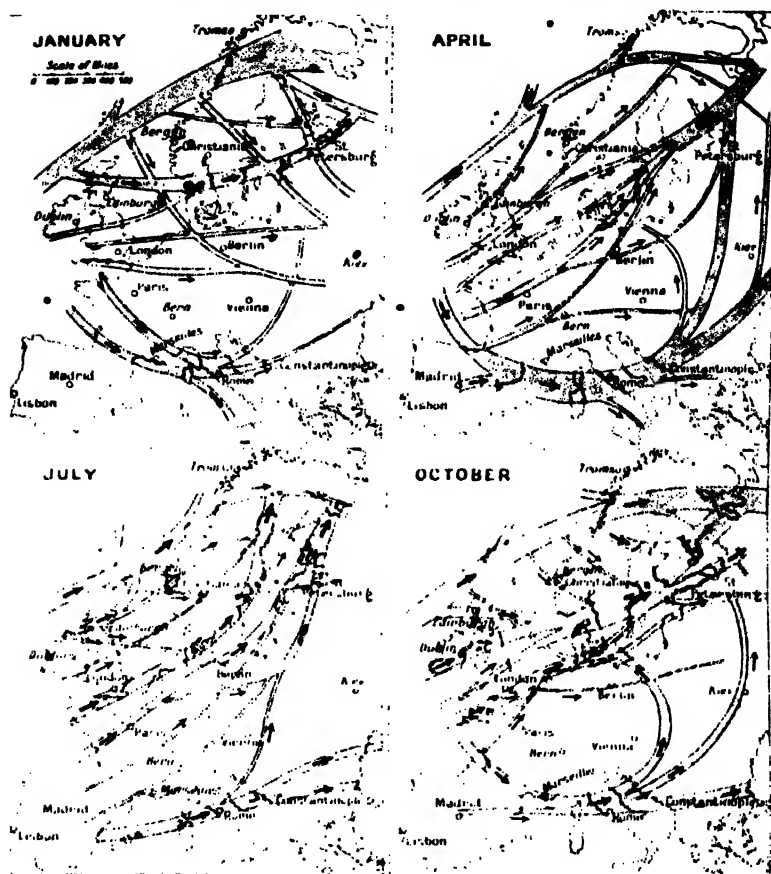


FIG. 18. Tracks of Depressions (van Belhber).

times remain almost stationary, but are rarely absent. The Azores high pressure is well to the south and of small intensity. The gradient over the British Isles is very steep for south-west winds. The cyclones follow mainly the tracks shown in Fig. 18. It must, however, be understood that though cyclones show a preference for certain tracks they do not confine themselves to them: they may travel

in any direction, but almost always they move towards some easterly point. Our winter weather is windy and rainy, moist and mild. The temperature depends far more on the direction of the wind than on the direct rays of the sun. A cloudy sky with a south-west or south wind is warmest, easterly and south-easterly winds are cold and also winds from any polar quarter. The warmest winds are far the most frequent (Fig. 19).

Summer. In July, the Iceland Low is much less deep, the Azores High much more intense. The gradient over our islands is less steep and the average winds more westerly and less southerly than in winter (Fig. 12). The more frequented cyclone tracks are shown in Fig. 18. Gales are rare, and the weather is much drier and finer than in winter. The sun exerts a marked diurnal control on temperature, the afternoons are hot, the lower clouds are usually of a cumulus form, and higher up beautiful cirrus is often to be seen. Thunderstorms are more frequent than in other seasons. The warmest winds are those from the south-east and south; winds from the west are cool; those from the north-west, north, and north-east still cooler.

Spring. April illustrates the spring conditions. The mean gradient is slight, but this does not truly represent the actual gradient day by day; for steep gradients, with strong winds, are common in early spring, but the pressure distribution is so variable that high and low pressures neutralize each other, and give fairly uniform means. Cold and dry east and north-east winds, specially trying to the skin and lungs, are more prevalent in spring than in other seasons (Fig. 19); indeed, at some stations east is the prevailing direction. Easterly gales are especially destructive to shipping. The dry air favours cold nights, and in clear, calm, anticyclonic weather night-frosts are often severe far into May. The heat of the sun, however, is great, and the mean daily range of temperature is greater in May than in any other month. A dreary yellow-grey mist or haze usually accompanying easterly winds often obscures the landscape in a drab gloom in spring.

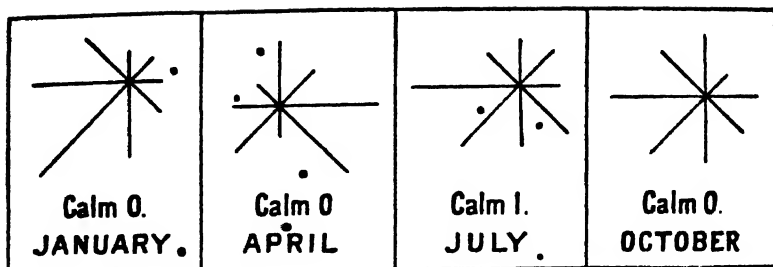


FIG. 19. Mean Direction of the Wind at St. Abbs Head, 1877-86.

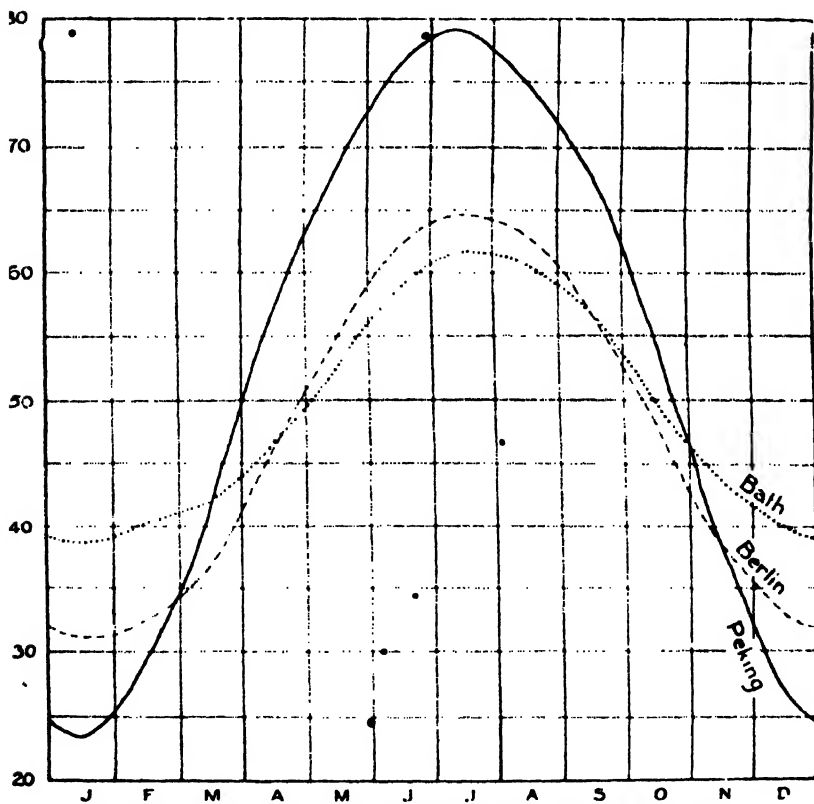


FIG. 20. Mean Monthly Temperature at Bath, Berlin, and Peking.

Autumn. Autumn foreshadows winter conditions. Warm moist south-west winds make it the rainiest season over most of the country. Fogs are frequent inland, sometimes lying stagnant and depressing for days together in late autumn. In early autumn, however, they are a feature of our loveliest weather: the sun rises hidden from view by a white surface-fog that has formed during the night; soon its disk appears dimly and its warm rays as it rises higher dissipate the fog entirely; a beautiful still day follows, the sun shining brightly in a deep-blue sky. Evening is chilly again, and as the twilight deepens white mists are seen creeping down the slopes and filling the valley bottoms. Such days often make late September and October very delightful.

3. *Temperature*

**Mean
values.**

If we considered only mean annual temperature London would have to be classed with Peking and Chicago, the 50° F. isotherm passing near all three cities, though London is about 800 miles nearer the Pole than the other two. Britain is thus favoured beyond most countries in the same latitude. The mean annual temperature, however, gives but a poor indication of the actual conditions. While at Peking the mean monthly values range through about 55° F., at London the range is only 24° F. (Fig. 20). The British Isles are cooler in summer and much warmer in winter than Northern China, for owing to the prevalent winds from the ocean the climate is very equable.

July.

July (Fig. 22¹) is the warmest month except on the south and west coasts, where the influence of the ocean retards the maximum, August being slightly warmer there than July. On the east coast July and August have about the same mean temperature.

The highest temperatures are found in the lower Thames valley, the lowest in the far north. The land and sea influence is strongly marked, the land heating more

¹ These maps show not actual but 'sea-level' temperatures, i.e. the observed readings are corrected by the addition of 1° F. for each 300 feet of altitude. Our highest summits are more than 10° colder than the isotherms show.

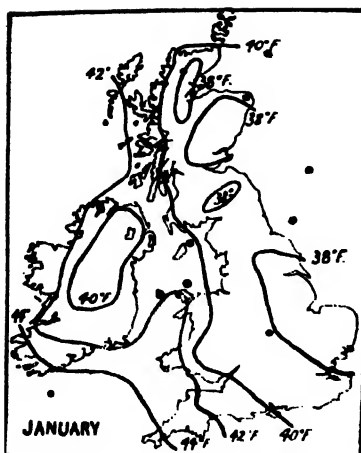


FIG. 21. Mean Temperature of the British Isles in January, reduced to sea-level.

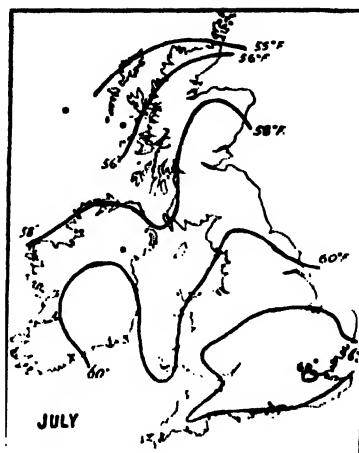


FIG. 22. Mean Temperature of the British Isles in July, reduced to sea level.

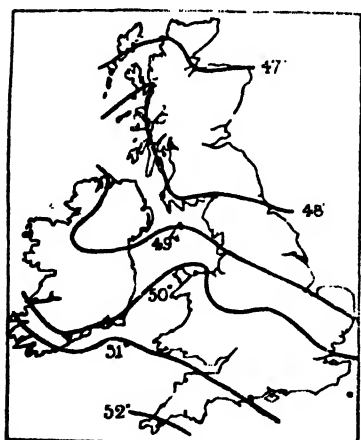


FIG. 23. Mean Annual Temperature of the British Isles, reduced to sea-level.



FIG. 24. Actual Mean Annual Temperature, unreduced.

rapidly and to a higher point than the water. The 60° isotherm shows this well. It encloses the south-eastern part of Ireland, makes a deep loop to the south over the Irish Sea, turns north again over Wales and England, and leaves Great Britain a little north of Spurn Head. The land is thus warm, the sea and the west coasts are relatively cool, despite the North Atlantic Drift.

January. January (Fig. 21¹) is typical of the winter conditions—the land cool and the ocean relatively warm. The chief source of heat is the North Atlantic Drift on our west, not the direct rays of the sun, and hence the isotherms run generally north and south. Cape Wrath, Bath, and the Isle of Wight have about the same temperature, 40° F. The greatest changes are found as we travel from west to east, e.g. Valencia has a mean of 44.4° F., Clacton, on almost the same latitude, 37.5° F. The south-west of Ireland and the end of the Devonian peninsula are warmest, the east of England and Scotland coldest. On parts of the west coast February is slightly colder than January.

It is to be noted that even the coldest parts of the country have a mean temperature far above freezing-point: ice is rarely seen on the rivers and the sea is never frozen.

Range of
tempera-
ture.

The contrast between the marine climate of the west coasts and the (comparatively) extreme climate of the east and interiors is shown in the map of mean annual range of temperature (Fig. 25) and in the curves of monthly temperature at Valencia and Kew (Fig. 26), typical of west and east, and at Wick and Clacton (Fig. 27), typical of north and south. The mean range of temperature in the course of a single day also is greater inland than on the coasts, 16.5° F. at Kew in July, 8.6° in January, 10.2° at Valencia in July, 8.8° in January.

During winter nights radiation chills the land and the air resting on it much more rapidly than the sea. The minimum readings are lowest in the Fens, much higher on the windier south-west coasts; the isotherms follow the coast-lines with striking fidelity (Fig. 28). In

¹ See note on p. 62.

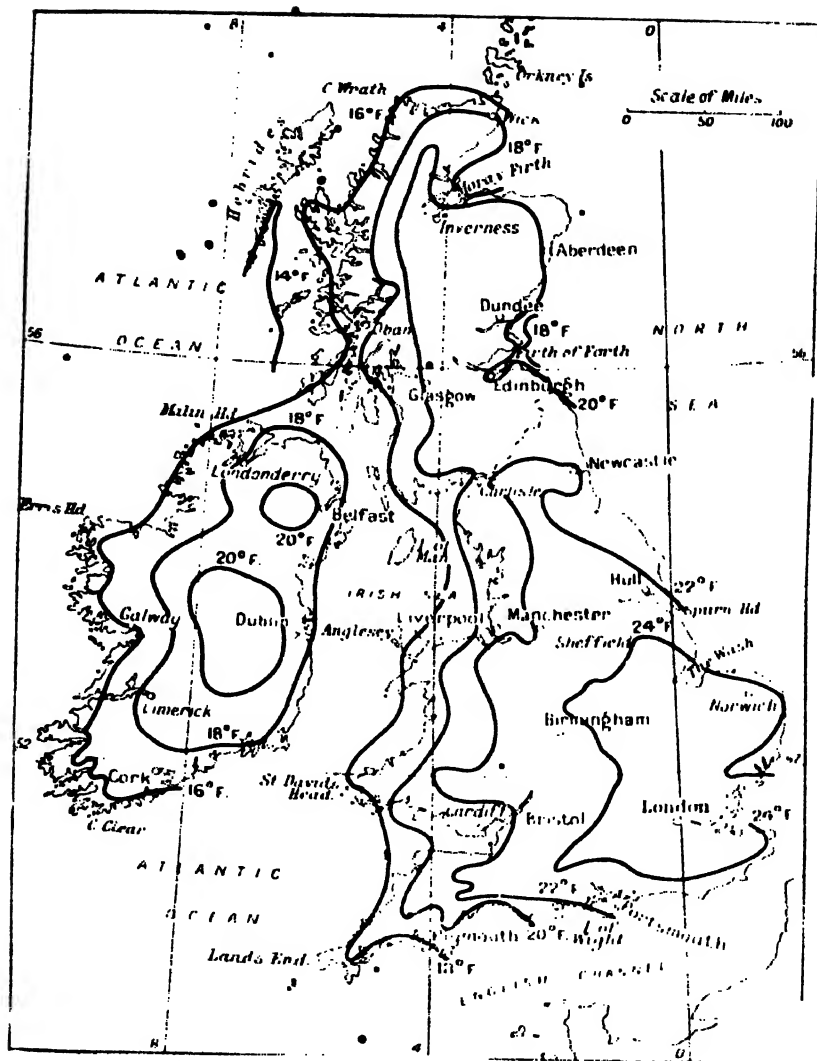


FIG. 25. Mean Annual Range of Temperature.

the long hot days of July, on the other hand, the land, owing to its lower specific heat, becomes hotter than the sea (Fig. 29) ; on the whole, the isotherms follow the same

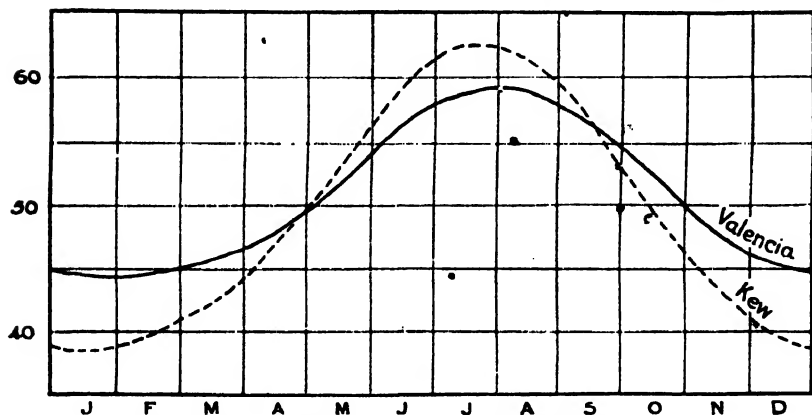


FIG. 26. Mean Monthly Temperature at Valencia and Kew.

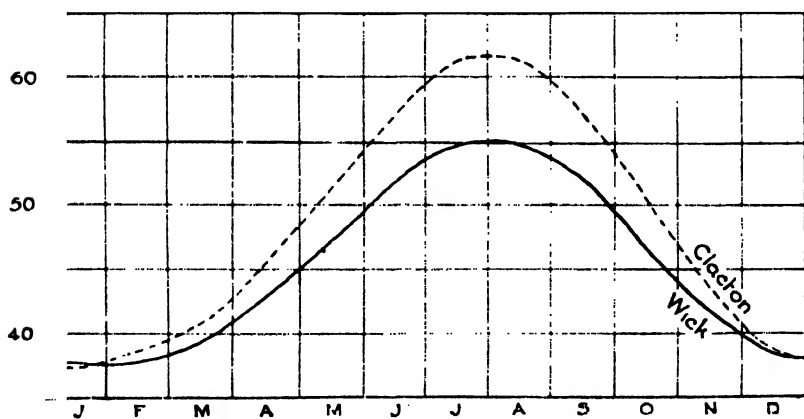


FIG. 27. Mean Monthly Temperature at Wick and Clacton.

course as those shown in Fig. 28, but the thermal gradient is reversed, and is even steeper, especially in the south of England, where there is a difference of over 5° F. in 25 miles. The areas of greatest heat are rather further south than those of greatest cold. The effect of relief is clearly marked, the valleys giving easier access to marine

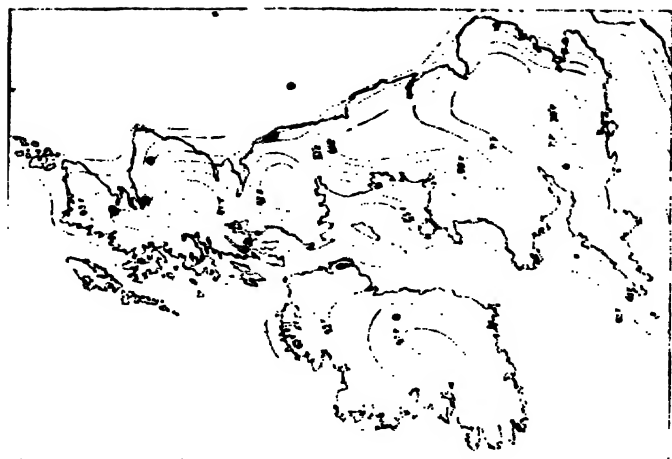


FIG. 29. Mean Daily Maximum Temperature in July.

(Soll und Ist)



FIG. 28. Mean Daily Minimum Temperature in January.

influences. The tendency of west coasts to oceanic conditions and of east coasts to those of the interior is seen in both these maps as in those of mean monthly temperature.

Seasonal variations. The curves of mean monthly temperature (Figs. 26, 27) show a regular increase and decrease from month to month. In the mean weekly temperature, however, there are numerous irregularities interrupting the smoothness of the curve (cf. *Trans. Royal Soc. Edinburgh*, xxxviii, Plate at end of volume). These weekly curves are drawn from means for such long periods that the irregularities can hardly be accidental.

The temperature on any particular day is usually very different from the mean value for that day, for the weather of the British Isles is very changeable: a rise of 50° in forty-eight hours is not unknown, and a rise of 40° in the same time is fairly common.

The lowest minimum temperatures recorded are not often below 10° F., but much lower readings have been observed, as low as -23° F. at Blackadder (Berwick) on December 4, 1879. Spells of great cold in winter occur when the sky is clear and the air calm, and sometimes, but by no means always, anticyclones provide such conditions. A draught of air from the north or east also brings cold, generally not so intense (Fig. 9).

Cyclonic weather, when the tracks of the depressions are to the north and the winds southerly, gives open winters, rainy and stormy, but warm.

In summer, anticyclones, when accompanied by cloudless skies, give the greatest heat, for the clear air allows the sun's rays to pass easily to the earth. Thus in 1911 pressure was high in August (Fig. 13), and the weather unusually warm. On August 9, 100° F. was recorded at Greenwich—the highest screen temperature ever known in this country—and very high readings were common. When the high pressure, which is usually centred in the Azores region, spreads to the north-east, or is displaced in that direction, so that the British Isles are covered by it for considerable periods, we are favoured by an unusually fine and warm summer. A displacement away from us



FIG. 30. Mean Annual Rainfall.

and the appearance of relatively high pressure over Iceland may leave us open to the passage of numerous low-pressure systems, which make our summer wet and cold.

In the south-east of England 80° F. is recorded almost every summer, and sometimes we find readings above 90° ; in the north of Scotland 80° is much rarer, and 90° is probably never reached.

Spring
frosts.

Spring frosts, due to nocturnal radiation through dry, clear, calm air, or to a cold northerly current of air sweeping the country in the rear of a depression, are a serious menace to agriculture even up to the end of May.

4. *Rain, Snow, Hail, and Humidity*

The situation of the British Isles is favourable for an abundant rainfall. They lie on or near the most frequented cyclone tracks and their shores are washed by a warm ocean, so that the air is always moist. Much of the western border presents a bold face to the prevalent westerly winds, so that very copious rains fall there, yet the mountains do not form such a screen as to produce an arid area in their rear, and nowhere is extensive irrigation necessary for agriculture.

Mean
annual
rainfall.

Fig. 30 gives the mean annual precipitation. A comparison with the orographical map shows clearly the close connexion of rainfall and relief. In the west, the windward side of the islands, the fall is heaviest, culminating in the Scottish Highlands, the Lake District, Wales, and Killarney. Among the highest mean annual totals are about 200 inches round Snowdon, 170 inches at Sty Head, Cumberland, 130 inches at Seathwaite, and 160 inches on Ben Nevis (4,406 feet above the sea).

The driest parts are in the east, where there is less than 25 inches round the Moray Firth (Nairn, distant only about 70 miles from Ben Nevis, has 24.9 inches), over much of the east midlands of England, and round the estuary of the Thames. Less than 30 inches fall in the east of Ireland, north of Dublin.

Most of the rain is associated with the passage of cyclones, a fairly steady but not very heavy fall of some

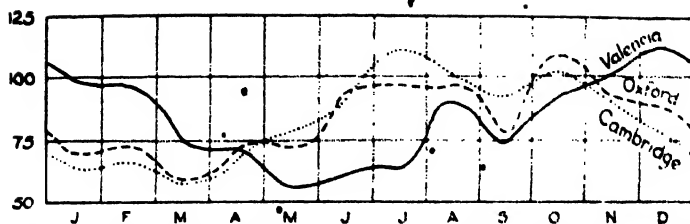


FIG. 31. Mean Rainfall for each Month (reduced to $\frac{1}{12}$ of a year) expressed in thousandths of the yearly total, at Valencia, Oxford, and Cambridge.

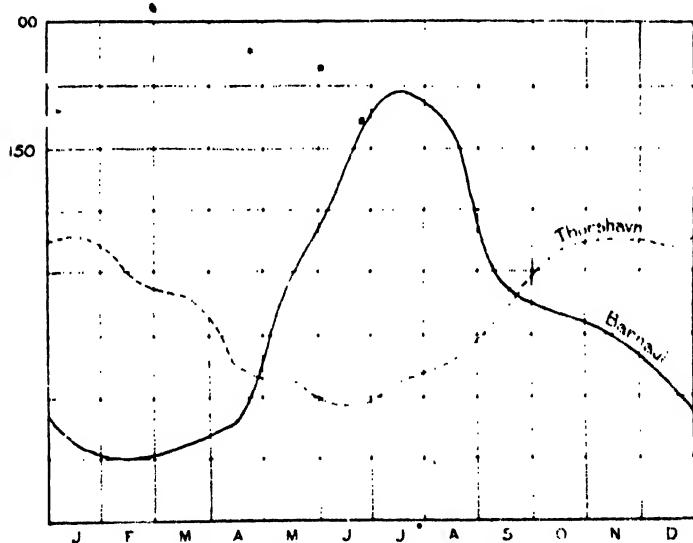


FIG. 32. The same, at Thorshavn and Barnaul.

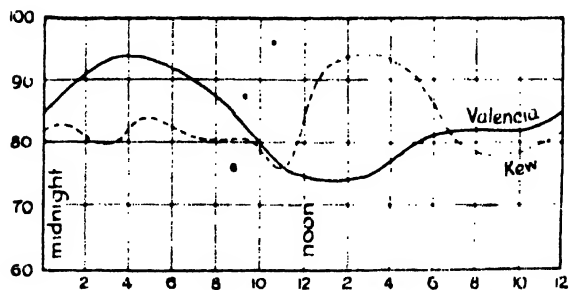


FIG. 33. Mean Hourly Rainfall at Valencia and Kew.

hours' duration being common. In the mountains wet mists add appreciably to the total, while in the south and east of England, the most 'continental' region, summer thunderstorms often give very heavy showers lasting an hour or less—3.63 inches fell at Maidenhead on July 12, 1901, in an hour, i.e. almost twice as much as usually falls there in the whole month. Snow makes perhaps 2 or 3 per cent. of the whole in the flatter parts, but a much larger proportion in the mountains of the north of England and Scotland. The amount of hail and dew included in the total is inconsiderable.

January
rainfall.

In January¹ the rainfall exceeds 4 inches over the western half of Scotland, the Lake District and the north-west Pennines, most of Wales, Devon and Cornwall, the Mendip Hills, and the coasts of Ireland. Ben Nevis has 18.3 inches, Seathwaite 12.2 inches. The east is comparatively dry: less than 2 inches falls round the Moray Firth, along the whole of the east coast of England, in the eastern Midlands and the Vale of York, and on the east coast of Ireland, north of Dublin. Spurn Head has only 1.2 inches.

July
rainfall.

In July the mountainous seaboard is still rainiest, but receives very much less than in January; the areas with more than 4 inches are much restricted, and among the heaviest falls are now only 10.8 inches on Ben Nevis and 10 inches at Seathwaite. The east, on the other hand, is now rainier than before, for only a very narrow strip round the estuary of the Thames has less than 2 inches, and East Anglia and the Fens, which had less than 2 inches in January, now have more than 3 inches. The increase is largely due to summer thunderstorms, which may give 1 or 2 inches in the course of a single afternoon. Extensive cyclonic disturbances, however, are now least numerous, and the west, which depends chiefly on them for its rain, is enjoying its dry season.

Spring
and
autumn
rainfall.

Over the British Isles as a whole spring is the driest season, autumn the wettest. The rainfall is almost everywhere of the 'oceanic' type—least rain in spring, when the

¹ For seasonal rainfall, cf. Bartholomew and Herbertson, *Atlas of Meteorology*, Pl. xxiii.

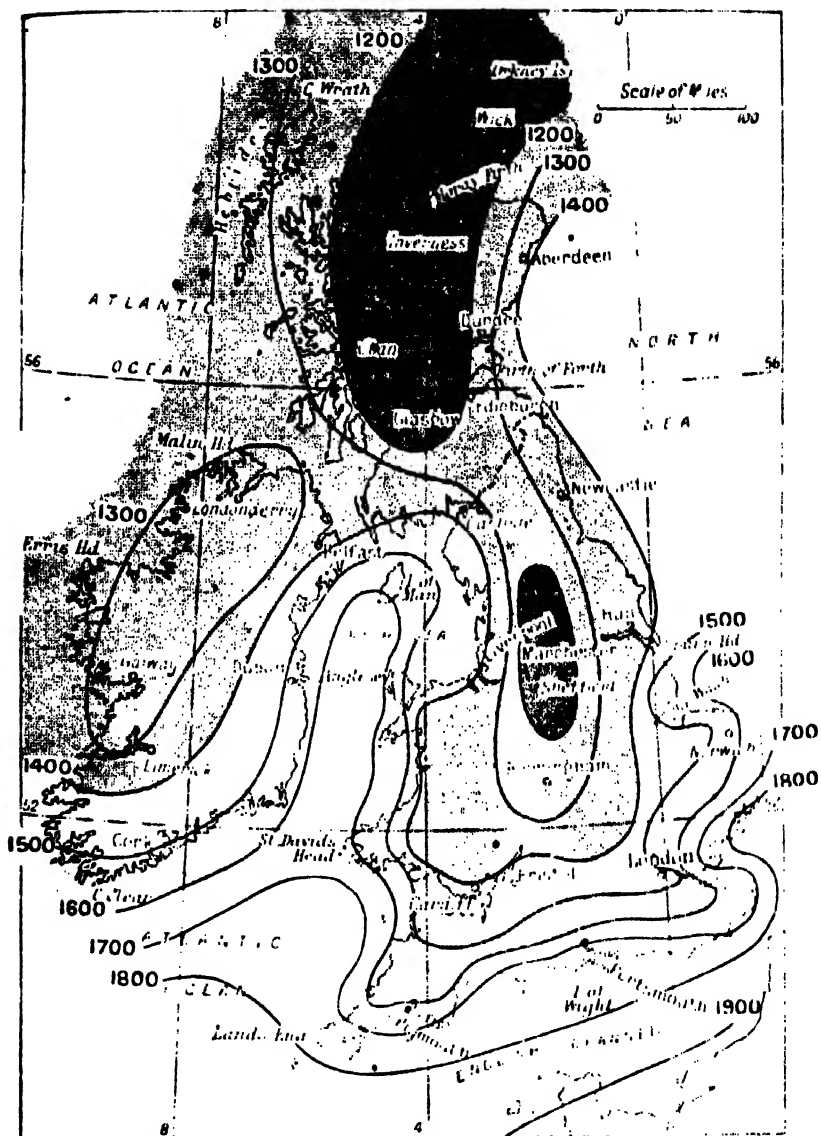


FIG. 34. Average Annual Sunshine, in hours (shown by heavy figures). (Curtia.)

Seasonal
distribu-
tion.

land is somewhat warmer than the sea and condensation is not active, most in autumn, when the warm moisture-laden winds from the ocean are chilled by the relatively cool land and give copious rains. Moreover, it is in autumn and winter that cyclonic activity, the immediate cause of most of our rain, is at its maximum. In East Anglia, however, the greatest monthly rainfall is in July, owing largely to the contributions of summer thunderstorms, as already mentioned. Curves showing the proportion of the yearly total received in each month at Valencia, Oxford, and Cambridge are given in Fig. 31, and those for Thorshavn, Faeroes, to represent the typical north temperate oceanic rainfall régime, and for Barnaul, Siberia, a typical continental station, in Fig. 32. Valencia approaches closely to the oceanic type, with its late autumn maximum and late spring minimum, with, however, a secondary maximum in summer. The Cambridge curve, with its maximum in July, is of the continental type, but its secondary maximum in October shows that even here the oceanic influence is strong. Oxford, 80 miles nearer the western ocean, illustrates the transition type. All three curves show a marked minimum in September, when the heat rains of summer have diminished and the heavy cyclonic rains of autumn not yet begun; the spring minimum is about two months earlier at the inland stations than at Valencia.

The mean monthly falls at typical stations are (in inches):

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Valencia	5.52	4.96	4.23	3.93	3.15	3.37	3.61	5.09	4.00	5.23	5.46	6.32	54.96
Dublin:	2.24	1.89	2.03	1.84	1.90	2.08	2.84	3.32	2.22	2.85	2.87	2.35	28.50
Phoenix Pk.													
Birmingham	2.04	2.66	1.70	1.87	2.23	2.47	2.56	2.92	2.37	2.83	2.36	2.24	27.40
Kew	1.70	1.59	1.59	1.66	1.76	2.25	2.30	2.36	1.97	2.70	2.19	2.09	24.16
Cardington (Bedford)	1.51	1.36	1.47	1.74	1.99	1.92	2.42	1.91	2.02	2.32	2.22	1.62	22.50
Buxton	4.66	4.00	3.93	2.87	3.27	3.42	4.12	4.66	4.17	5.39	4.97	5.13	50.60
Liverpool	2.09	1.76	1.83	1.69	1.99	2.25	2.69	3.16	2.55	3.36	2.60	2.63	28.60
North Shields	1.53	1.43	1.74	1.63	1.91	1.81	2.50	2.84	1.75	2.97	2.24	2.21	24.56
Leith	1.73	1.45	1.68	1.46	1.83	1.82	2.73	2.95	1.84	2.40	1.98	1.99	23.86
Aberdeen	2.09	2.11	2.42	2.09	2.27	1.82	2.79	2.95	2.38	2.95	3.05	3.27	30.19
Fort William	8.68	6.87	7.01	3.97	3.48	3.48	4.64	6.89	8.20	7.92	7.50	11.32	79.96
Wick	2.42	2.24	2.25	1.96	2.05	1.82	2.66	2.75	2.52	3.09	3.02	3.08	29.86

CLIMATE

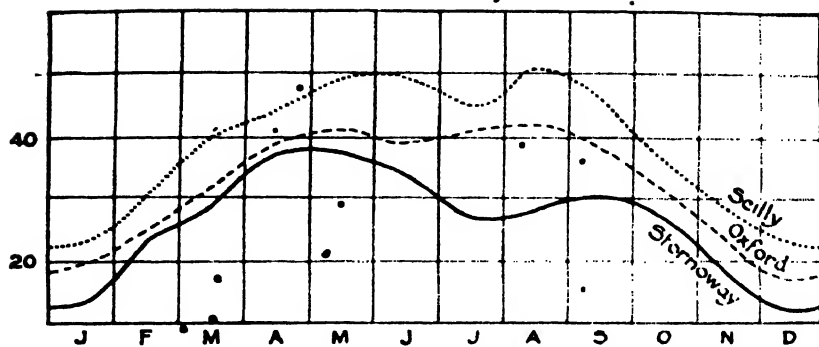


FIG. 35. Percentage of possible Duration of Sunshine, at Stornoway, Oxford, and the Scilly Isles.

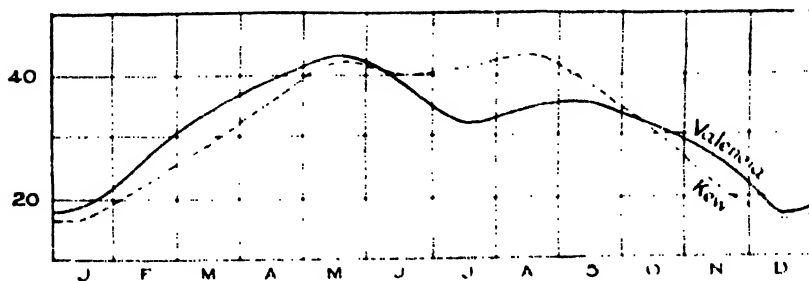


FIG. 36. The same, at Valencia and Kew.

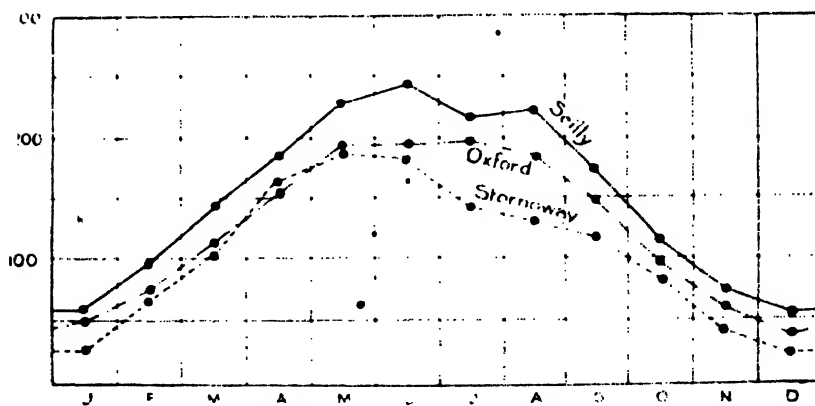


FIG. 37. Monthly Duration of Sunshine, in hours, at Stornoway, Oxford, and the Scilly Isles.

Number
of rainy
days.

If a rainy day be regarded as one on which 0.01 inch or more of rain falls, the north and west of the British Isles have about 7 days rainy out of every 10 on the mean of the year; rain is least frequent, as well as least abundant, in the south-east of England, as at Oxford, which has less than 5 rainy days out of every 10. Autumn and winter everywhere give the greatest number, spring and early summer the fewest; Sumburgh Head has 27 rainy days in an average December, only 15 in June; at Oxford the figures for these months are 16 and 12.

Intensity
of rainfall.

By dividing the mean monthly total rainfall by the number of rainy days in the month the mean amount of rain per rainy day is obtained. The values for certain stations are (in inches):

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Sumburgh Head	.15	.14	.12	.11	.11	.11	.13	.16	.16	.16	.17	.16
Oxford	.12	.12	.11	.12	.14	.19	.18	.18	.16	.17	.16	.14

Seathwaite has an annual average of 0.61 inch per rainy day.

The amounts at all stations are lowest in spring, when the sea, the immediate source of almost all the moisture, is relatively cold. Sumburgh Head has its highest values in autumn, when the sea is relatively warm and deep depressions numerous, but the southern stations receive most rain per rainy day in the heat of summer, when thunderstorms send up the total.

Diurnal
period of
rainfall.

On the west coast more rain falls at night than by day (see curve for Valencia, Fig. 33), for the cooling of the sea winds by the land is the most important influence; in the interior the afternoon is the rainiest period (see curve for Kew, Fig. 33), owing chiefly to summer thunderstorms, but there is a secondary maximum at night.

It was mentioned in the section on temperature that 'surges' of heat and cold of a few days' duration tend to occur at or about the same date every year. The same tendency appears in rainfall, so far as weekly means have been calculated. The weekly curves for such long periods

that chance coincidences must have been eliminated are available for Edinburgh and Greenwich.¹

So far only mean values have been considered. But ^{Extreme} the rainfall of any given day, month, or year may differ falls, widely from the average. The greatest and the least annual falls on record at certain stations are :

Station. ²	Greatest yearly fall on record.	Per cent. excess over mean annual.	Least yearly fall on record.	Per cent. deficit from mean annual.
	ins.		ins.	
Valencia	68.67 in 1877	10	43.74 in 1887	24
Oxford	40.42 in 1852	57	17.56 in 1870	32
Greenwich	35.54 in 1903	46	16.38 in 1864	33
Edinburgh	38.96 in 1872	51	15.27 in 1856	41

The greatest and least monthly falls (i.e. falls during complete calendar months) recorded are :

Station.	Greatest fall in a month.	Mean for the month in question.	Least fall in a month.	Mean for the month in question.
	ins.	ins.	ins.	ins.
Valencia	10.44, Nov. 1877	5.46	0.70, May 1876	3.15
Oxford	7.53, Oct. 1875	2.87	0.02, Apr. 1912	1.70
Greenwich	7.65, Oct. 1880	2.71	0.01, Feb. 1866	1.54
Edinburgh	10.60, Sept. 1785	2.90	0.03, Mar. 1781	1.97

As much as 4.20 inches has been recorded in one day, December 9, 1787, at Edinburgh ; over 3 inches on July 26, 1867, at Greenwich (here a fall of over 1 inch in a day was recorded on 94 occasions in 63 years) ; over 9.5 inches on August 6, 1857, at Scarborough. The month of August 1912 was one of the wettest on record over much of England, certainly in East Anglia, where some stations had more than 12 inches ; the 'rainfall day' with the heaviest fall was August 26, when Brundall, near Norwich, had 7.31 inches, but over 8 inches fell, probably within twenty-four hours, on August 26-27, in

¹ See *Trans. Roy. Soc. Edin.*, vol. xxxviii, and *Journ. Roy. Statistical Soc.*, vol. lxviii, p. 288.

² The Valencia, Greenwich, and Edinburgh figures are derived from 'The Climatology of Valencia Island', J. E. Cullum, *Quarterly Journal of the Roy. Meteorological Society*, vol. xxii ; 'Monthly Rainfall at the Royal Observatory, Greenwich, 1815-1903', W. C. Nash, *ibid.*, vol. xxx ; 'The Meteorology of Edinburgh', R. C. Mossman, *Trans. Roy. Soc. Edin.*, vols. xxxviii and xxxix. The Radcliffe Observer at Oxford kindly supplied the Oxford figures.

parts of Norfolk ; this was a steady cyclonic rain, not a thunderstorm downpour. Probably every part of the British Isles is liable to receive 4 inches in twenty-four hours. These heavy rains are most frequent in summer and autumn, when the warm air can contain most moisture. Sometimes they fall during thunderstorms, sometimes they are due to a cyclone which either remains stationary over our islands or moves slowly, remaining for some days within our area. Extraordinarily heavy falls of shorter duration are 3·63 inches in one hour on July 12, 1901, at Maidenhead ; 2·9 inches in 30 minutes on July 22, 1880, at Glamorgan ; 1·25 inches in 5 minutes on August 10, 1893, at Preston.

Droughts. Droughts of sufficient duration to cause serious agricultural distress are rare. The longest rainless period known to have been experienced in Edinburgh is 33 days, May 24 to June 25, 1786 ; in the years 1770 to 1896 there were sixteen periods, each of over 20 days, without rain, almost all in early spring. At Greenwich, during a period of sixty-three years, there were 103 droughts, each of 14 or more days. The longest continuous period of relatively dry weather over England generally was in 1893, when the rainfall was below the mean for 15 consecutive weeks, during 6 of which no rain at all fell.

In general, rain is scanty or absent when an anticyclone is centred over Britain or lies to the north, giving dry north-east winds. Spring is the season with the greatest tendency to drought.

Snow. Snow falls almost every winter throughout the British Isles, but, except in the mountains, the amount is usually small. Even in London and the Isle of Wight snow has been known to fall in July, but it has never been recorded in August in the south of England.

As a rule, snow never lies for more than a few days at a time. At Greenwich there are 14 days with snow in an average year ; in some years none at all falls ; in the winter 1887-8 there were as many as 43 days with snow ; the mean date of the first snowfall is November 9, of the last, March 30. Edinburgh has on an average 21 snowy

days in the year; the greatest number was 47 days in 1782, the least, 3 days in 1856; the mean date of the first snow of the winter is November 22, of the last, April 10. In the south-west of England and the south and west of Ireland snow hardly ever lies for more than a day; in the mountains of Scotland a winter rarely passes without snow-ploughs being requisitioned to clear the railway lines for traffic.

The pressure distribution that is favourable to a fall of snow has been described on pp. 52, 54.

Hail often accompanies thunderstorms and line-squalls in spring. It rarely, if ever, does serious damage to property.

Relative humidity is almost always high, as is to be expected in a marine climate. In autumn and winter the air is often almost saturated with moisture for several consecutive days; but in spring and summer readings as low as 40 per cent. are sometimes recorded: 18 per cent. is said to have been observed at Edinburgh on one occasion. Even drier air is not unknown on the tops of the mountains, as Ben Nevis records show. Relative humidity.

The air is almost always drier inland than on the coast. But during winter nights our south-western seaside resorts are usually less humid than places inland, since the temperature in the interior is lower and the relative humidity therefore greater.

The driest winds are from the east, especially in spring.

5. *Sunshine, Cloud, Fog, and Thunderstorms*

One of the least pleasant features of our climate is the scanty sunshine. Spells of almost cloudless skies for periods of several weeks are, indeed, not unknown, but a dull grey pall of cloud is much more usual.

The coast is everywhere the most favoured part, especially the south coast of England with about 1,700 hours per year (Fig. 34). The further north we go the nearer we approach the most frequented cyclone tracks, and the less is the sunshine; there is less than 1,200 hours in the north of Scotland. The number of hours the sun is above

the horizon in a year is approximately the same at sea-level all over the world—about 4,380 hours. The interior parts of the south of England have notably less than the coast of the Channel; thus Oxford has 1,467 hours, Scilly 1,802. There is less sunshine inland at all seasons, but in summer chiefly. The chilling of the winds as they blow inland in winter, the prevalence of fogs in the interior in the same season, and the abundant cumulus clouds in summer-time are probably the chief causes. In some places the shadow of the mountains affects the record. Smoke from the industrial districts near by is largely responsible for the small total of the southern Pennines.

From Fig. 35 we see that not only does the north of the United Kingdom get a smaller proportion of the total sunshine possible than the south, but even in summer there are fewer hours of sunshine at Stornoway than at Scilly—92 hours fewer in August, though the sun is above the horizon 26 hours longer.

The west and east of the country get about the same number of hours of sunshine in winter, but in spring and autumn the west has an advantage, in summer the east (Fig. 36).

Cloudi-
ness.

The mean annual cloudiness, in tenths of the sky covered, has been estimated as follows :

N. lat.	0	10	20	30	40	50	60	70
Sky covered	5·8	5·0	4·0	4·2	4·9	4·8	6·1	5·9

The British Isles lie near the cloudiest part of one of the cloudiest belts on the earth. Even when no rain is falling an unbroken mass of dull-grey stratus frequently covers the sky for many days together, especially in winter.

Fogs.

Fogs are of two kinds. Sea fogs are most common on the Atlantic coasts in early summer with very light winds (but occasionally they accompany high winds and rain). The other type is mostly an inland visitation, though it sometimes extends over narrow arms of the sea, especially the English Channel. During autumn or winter anti-cyclone, radiation from the ground chills the almost

stagnant air often to the dew-point, and the moisture it contains is condensed. This fog is usually only a thin layer, not more than two or three hundred feet thick. Under these circumstances the weather at any station depends largely on the topography: the valley bottoms may be filled with cold damp fog at a temperature much below freezing-point, while a hill-top a few hundred feet above, and not a mile away, is enjoying cloudless skies and a dry warm air.

The figures¹ given below for Sumburgh Head and Scilly are representative of summer sea fogs; those for London, Oxford, and York show a winter maximum due to the inland type of fog; North Shields and Yarmouth are foggy at all seasons, receiving both sea fogs in summer and land fogs in winter.

TOTAL NUMBER OF TIMES FOG WAS OBSERVED 1876-90

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Sumburgh Head	5	1	9	8	23	30	44	47	18	11	5	1	202
Scilly	38	35	33	24	48	77	64	66	48	17	23	23	496
London	131	84	73	32	16	7	7	10	82	132	117	143	834
Oxford	103	58	42	15	3	1	2	10	61	87	101	116	599
York	73	32	16	8	4	0	0	8	23	51	62	69	346
North Shields	45	33	33	21	29	21	9	28	54	54	49	68	444
Yarmouth	144	97	59	42	24	16	6	12	32	79	97	134	742

The rise of great centres of manufacture and residence has produced a modification of the winter type of fog, which is most marked in London. That city, owing to its position, is very liable to autumn and winter anticyclonic fogs, and when its myriad chimneys pour their smoke into the foggy air an impenetrable darkness enshrouds the streets.

Thunderstorms occur chiefly in summer, usually in the afternoon or evening. They are most numerous in July. They are common (1) at the end of a spell of hot sunny weather, as shallow depressions form; (2) when there is a col of low pressure in summer; (3) in line-squalls.

About fifteen to twenty thunderstorms per year occur

¹ 'Fifteen Years' Fogs in the British Islands, 1876-90,' R. H. Scott, *Quarterly Journal of the Royal Meteorological Society*, vol. xix. Probably the figures given above should be regarded as only approximate.

in the northern and eastern parts of England; the south-west of England and the south and west of Ireland have only four or five.

Winter thunderstorms, mostly nocturnal, are an interesting phenomenon on the west coast of Scotland. They are experienced when a deep depression causes violent west and south-west winds to sweep over the lofty coastal region with rapid and abundant condensation of moisture. These thunderstorms do not move onward, but are confined to the coast, the region of dense cloud and heaviest rain; only one or two occur each winter.¹

6. Climatic Divisions

Temperature and rainfall.

The most important elements of climate are temperature and rainfall. We have seen that in summer the temperature depends on latitude, but is modified by land and sea influences; the south and east of England are warmest, being furthest from the ocean to windward; the north of Scotland is coldest. In winter the distribution is quite different; temperature now decreases from south-west and west to east—in January, from over 44° in south-west Ireland and Cornwall to less than 38° along the east coast. The east and south-east of England and the east central parts of Ireland therefore have a greater range than the western sea-board, their climate is relatively continental (but only relatively, since their annual range nowhere exceeds 26°).

Rainfall depends chiefly on relief, almost all the western coast both of Great Britain and of Ireland has more than 40 inches annually, much of the east of Great Britain gets less than 25 inches.

The following climatic regions are based on these facts. Only the general influences are referred to; in many places such local characteristics as exposure and soil have considerable importance, but they must necessarily be ignored here. We begin with the coastal belt.

¹ *The Mean Prevalence of Thunderstorms in Various Parts of the British Isles during the Twenty-five Years 1881-1906*, F. J. Brodie (read before the Royal Meteorological Society).



PLATE XVII. SNOWDON, NORTH WALES, FROM CAPEL CURIG PATH

(Phot. W. M. Spooner)



PLATE XVIII. KYNANCE COVE AND OLD LIZARD, CORNWALL

(Phot. W. M. Spooner)

Cornwall and Devon, almost sea-girt, have an equable marine climate, generally relaxing: the summers are moderately warm, the winters much warmer than those of any other part of the British Isles, making the Cornish Riviera a winter refuge for many invalids. A nearer approach to sub-tropical vegetation is found here than elsewhere. The annual temperature range is small (18°). The spring is somewhat cooler and the autumn warmer than in the interior, frost is much less frequent, and snow is rare and never lies long. The mean daily minimum temperature in January (39°) is about 18° higher than in the Fens, the mean July maximum (66°) about 5° lower. At Scilly the thermometer rarely touches freezing-point—even in December 1879, one of the coldest months ever experienced in the country as a whole, there was no frost there.

The rainfall is considerable—over 40 inches in most of the area—and the air is humid. During winter nights, however, it tends to be slightly less moist than in the cold and often foggy interior of England. Ferns grow luxuriantly. Strong sea winds prevent much tree growth except in the sheltered lowlands. Sunshine is more abundant than in any other part of the British Isles, but ~~sun~~ fogs are common in spring and early summer.

The region includes Dartmoor, Exmoor, and other uplands, with heavier rain and lower temperature.

The rest of the south coast of England (including the Isle of Wight), a strip about twenty miles wide, has similar characteristics, but is distinguished by a much smaller rainfall, especially in winter, and by its considerably lower winter, and slightly higher summer, temperature. Towards the Straits of Dover the bracing qualities of the east coast begin to appear.

The whole of the east coast of England and Scotland is somewhat alike, and very different from the Atlantic coast. The rainfall is everywhere only about half as great (under 25 inches in many parts), and the winter temperatures here are among the lowest in the British Isles. The air is bracing, and especially in spring and early

BRITISH ISLES

summer east winds are stronger and more trying than in the rest of the country. Shipmasters have good reason to dread being caught in an easterly gale off this coast.

Southern
division.

An area extending for about 500 miles from north to south, however, shows considerable minor variations, and requires to be subdivided. The southern part, including the valley of the Thames below Reading, East Anglia, and the Fens, has the most extreme climate. The country round London is the warmest in summer, over 64°; East Anglia is coldest in winter; the mean annual range exceeds 24°; the mean daily maximum in July is over 70°, except on the coast itself; the mean minimum in January under 32° in many parts. The winter cold and the existence of numerous waterways cause the Fens to be one of the best skating districts in the country, but even here many winters pass without the ice bearing. Snow is common in winter, but it is rare for it to lie more than a few days. Fogs are prevalent in autumn and winter, those of London being noted for their darkness. The air in the Thames valley is humid and enervating, but the east coast itself, especially Ramsgate, is bracing, dry, and sunny.

Central
division.

Lincolnshire forms the transition to the central division of the east coast, extending from the Humber to the Tay. The land slopes down to the sea from the Pennines and Southern Uplands, and is much exposed to biting east and north-east winds, which are so frequent, especially in spring, as to be an important factor in the climate. In winter the moors are often snow-covered, and even westerly winds blowing over them become very cold; hence this season may be specially unpleasant by reason of strong damp winds, cold from whatever point they blow. The rainfall is about 30 inches. The watering-places on the Yorkshire coast have the reputation of being very bracing; the Vale of York has much fog and damp.

The
northern
division.

The northern division of the east coast, from the Tay to Caithness, is distinguished from the divisions to the south by its cooler summers. The Highlands to windward cause the rainfall to be small—under 25 inches in a small area round the Moray Firth. The valleys that penetrate



PLATE XIX. ISLAND OF STAFFA, SCOTLAND

(Phot. W. M. Spencer)



PLATE XX. OLD MAN OF HOY, ORKNEY ISLANDS
(Phot. W. M. Spooner)

the mountains are much favoured in summer—' Deeside, Donside and Speyside, above 700 feet, have the finest summer climates, in the British Isles, bracing, cool, little rain' (Buchan). Balmoral is suitably chosen for a royal residence.

Northern Caithness, Orkney, and Shetland have colder summers and springs than any other part of the British Isles at the same altitude, but in January they are not colder than the Thames estuary. Kirkwall has a mean annual range of temperature of 15.6° , from 39.3° in January and February to 54.9° in August. The rainfall is low. In these high latitudes and on the west coast, about to be described, we have our nearest approach to the stormy conditions of the Icelandic region—low barometer, frequent gales, many rainy days, cloudy skies, scanty sunshine. Orkney and Shetland have especially violent winds and tree growth is possible only in sheltered valleys.

The contrast between the length of the day in winter and in summer is very marked; on the shortest day the sun is above the horizon at latitude 60° for only $5\frac{1}{2}$ hours, at midsummer for $18\frac{1}{2}$ hours, and it is possible then to read at midnight without artificial light.

The west coast of Scotland and the Hebrides have a very equable climate. High hills abut on the ocean; very heavy rainfall, moist air, cool summers, and mild winters are the characteristics. In winter the region is about 2° warmer than London, 400 miles further south, and 2.5° warmer than Aberdeen, on the same latitude on the east coast. The mean annual temperature range is small, 15° to 17° . The rainfall of the Hebrides, though less in amount, is almost as persistent as that of the mainland.

On the inhospitable, almost uninhabited hills it is much rainier and colder; these upland conditions culminate in Ben Nevis, 4,406 feet, whose summit is snow-covered most of the year (see end of this chapter).

Ireland as a whole differs from the larger island in having a more equable temperature and a more evenly distributed rainfall, owing to its more oceanic position and the arrangement of its mountains: in place of the

The northern islands and coast.

The west coast of Scotland (excluding Firth of Clyde) and the Hebrides.

steeply rising mountains on the west coast of Great Britain which fall sharply to the plains of the interior and east coast, Ireland has a lower and fairly continuous broad rim of uplands surrounding it on the north, west, south, and half the east coast. All this elevated rim, and especially the western part of it, has heavy rain, but even Killarney has a smaller annual amount than much of the west coast of Great Britain. Sheltered behind the rim the central plain has much less rain, and least of all, under 30 inches, falls near the coast north of Dublin, but the minimum in Ireland exceeds the minimum in Great Britain. The Emerald Isle enjoys a moist climate, and rarely suffers from drought. The winters are milder than in Great Britain.

Western
Ireland.

Western Ireland, including Donegal, continues the equable rainy West-Scottish climate, but lying further south it is about 2° warmer on the mean of the year, and is especially warmer on winter nights, the mean minimum for January being as much as 5° warmer than in West Scotland. In Kerry the influence of the North Atlantic Drift is almost as marked as at Scilly. At sea-level the thermometer rarely touches freezing-point, and at Valencia snow has never been recorded between the end of May and the beginning of October. The rainfall exceeds 50 inches.

Southern
Ireland.

The south coast of Ireland is more favoured; the equability of the west coast is continued, but the summers are warmer, the rainfall far less, equal to that of the coasts of Devon and Cornwall, and sunshine far more abundant, about 1,500 hours per year, rather above the average for the British Isles.

Eastern
Ireland.

The east coast shares the somewhat extreme conditions of temperature of the interior of the island, but they are modified by the proximity of the sea.

There are three well-marked subdivisions: Counties Wexford and Wicklow contain some of the most mountainous country in the island, and have in places considerably over 40 inches of rain in the year, far more than our next subdivision, Counties Dublin, Meath, and Louth,

which have the lowest rainfall in Ireland, about 30 inches; north of this again we have our third subdivision, County Down and the coast of Antrim, where the mountains and hills again raise the rainfall above 40 inches.

We must now return to Great Britain to complete our survey of the climate of the coasts of the British Isles.

The shores of the Firth of Clyde are certainly equable, and have almost the same mean annual temperature as the west coast of Scotland further north. The shores of the Firth of Clyde. The mean temperature in January is about 40°, in July 58°. The sunshine record, about 1,200 hours per year, among the lowest in our islands, and a rainfall between 40 and 60 inches, indicate that these climatic factors are hardly to be reckoned among the charms of the many watering-places set here for Glasgow's relaxation.

This region also, lying to leeward of the Irish Sea, suffers from no lack of rain: at least 35 inches falls almost everywhere, and this figure is greatly exceeded in the Lake District; here about 170 inches is the mean annual fall at the Sty, so that the Lake District maintains its true mountain character meteorologically as in other respects. Often for weeks together the clouds hang low over the mountain tops. Snow generally lies on the uplands till far into spring. North and east coasts of the Irish Sea.

South of Cumberland the rainfall rapidly diminishes to less than 30 inches in the Midland Gap, but the air remains humid, a fact of the utmost benefit in the cotton industry of South Lancashire.

The Isle of Man, lying in the middle of the Irish Sea, has a very equable marine climate, with comparatively cold springs, cool summers, and mild autumns and winters. 'There is comparatively little frost and snow, but a considerable amount of raw damp weather; its sunshine is much greater than in any surrounding district.'¹ Its rainfall varies from under 30 inches to over 40 round Snaefell.

We find warmer conditions on the coasts of Wales. In winter it is about 3° warmer here than in Lancashire; The Welsh coasts.

¹ A. W. Moore in *Journal of Scottish Meteorological Society*, vol. viii.

in summer there is not much difference between them. Here also we have a sea to windward of a mountainous coast, and hence a heavy rainfall everywhere, about 40 inches on the coast itself, rising rapidly among the mountains, and reaching its maximum, over 200 inches, on the slopes of Snowdon; this is the heaviest fall recorded in the British Isles. The smallest range of temperature is in west Anglesey, and at the ends of the Lley'n and Pembroke peninsulas, where it is, about 18° , the same as in west Cornwall. Sea fogs in spring and summer are a frequent menace to mariners rounding St. David's Head and entering the Bristol Channel, this being one of our foggiest seas.

We pass now to the consideration of the inland parts of Great Britain and Ireland.

Central
Ireland.

The centre of Ireland is a great plain, almost a dead level from Dublin to Westport, from Carrick-on-Shannon to Birr, and is abundantly watered by many rivers, lakes, and bogs. As soon as we leave the sea the annual range of temperature increases, till it exceeds 20° over much of central Ireland. The same fact is strikingly shown by the maps of mean maximum temperature in July and mean minimum in January (Figs. 29 and 28). At the same time the amount of sunshine becomes less. The rainfall varies from 30 inches in the east to 50 in the west. The air is moist.

The
Welsh
Marches.

In England the Welsh Marches form the transition from the equable rainy Welsh mountains to the drier and more extreme climate of the Midlands, about to be described. The mean annual range of temperature is about 23° . We may subdivide this border strip into two parts: the northern is somewhat the cooler; roughly it is the area drained by the Upper Severn and Dee, and includes south Cheshire and north Shropshire; it is bounded on the north-east by the rainy Pennines, and on the west and south-west by the still rainier mountains of Wales; the southern section is the Plain of Hereford, with about the same temperature in winter and about 2° more warmth in summer, and hence a greater

annual range. We have here an 'island' of light rainfall, about 30 inches, surrounded by the heavier falls of the Clee Hills and Weplock Edge on the north, the Welsh mountains on the west, the Forest of Dean on the south, and the Malvern Hills on the east.

The most extreme conditions our islands contain are to be found in Huntingdon, Bedford, Cambridge, and Hertford—wheat-growing England; in January they are among our coldest counties, in July among our warmest. As we go west towards the Welsh Marches we reach more equable conditions.

The Mid-lands of England.

The hills in the Midlands are of no great altitude, nowhere much above 700 or 800 feet, so their climatic importance is in general not very great, but even these low hills are rainier than the lowlands around; their influence on temperature is in places noticeable, as at Cheltenham, which, lying in a very sheltered position at the base of the Cotswold scarp, is sometimes 'extremely hot and relaxing' in summer,¹ especially in comparison with the cool windy hills above it.

Sunshine everywhere becomes decidedly less as we leave the coasts. Rainfall varies from just under 25 inches to a little over 30 on the Cotswolds and North Downs, and over 40 on the Mendips. Fogs are prevalent, especially in autumn and winter.

The Pennine moors, mostly between 1,000 and 2,000 feet above the sea, have a low temperature, scanty sunshine, and heavy rainfall, for the most part 40 inches at least. The annual range of temperature, about 22°, shows that we must class them with our inland rather than our coastal regions, though the sea is never very far distant. Buxton, near the southern end of the Pennines, is typical of its neighbourhood: it is bracing and windy with a keen air, 'remarkably cold in winter.'¹ Snow is common everywhere in the winter half-year, but except on the highest points it does not generally lie long.

The Pennines and Southern Uplands.

Adjoining this region and separating it from the Lake District is the low-lying vale of Eden, with a much

¹ *The Climates and Baths of Great Britain and Ireland.*

lower rainfall. Inversions of temperature are not infrequent : from Cross Fell one can often look across a sea of chilly fog filling the valley to the Cumbrian Mountains, which rise like the Pennines into bright sunshine above the fog.

The
Scottish
Highlands.

In the last of our climatic regions we include all the interior of Scotland north of the Central Lowlands—a wild mountain tract rising to 4,406 feet above the sea in Ben Nevis. The excellent series of hourly observations made here and simultaneously at Fort William, a sea-level station not five miles distant, enables us to form an accurate idea of the climatic conditions on the mountain tops as well as in the valley bottoms. On the average for the year it is 15.4° colder at the high station, slightly more in spring and summer, the greatest mean monthly difference being 16.8° in April; slightly less in autumn and winter, the smallest difference being 14.4° in December. The mean difference varies with the time of day, being least between 4 and 5 a.m. and greatest between 3 and 4 p.m. It varies also with the weather, the vertical distribution of temperature during rough cyclonic and calm anticyclonic weather being very different. During the former it is always much colder on the summit than at the lower station : as much as 28.8° difference was observed on December 19, 1890, at 2 a.m. ; these great differences occur during strong winds, generally with a low barometer. An extraordinary contrast is presented by the conditions that often prevail in the still air of an anticyclone ; in spite of, or we ought rather to say because of its altitude, the summit of Ben Nevis is then frequently actually warmer than Fort William far down in the valley below ; 'the most notable of these occurrences took place on 19th Feb., 1895, when at 9 a.m. the temperature at Fort William was 16.0° , and on the top of Ben Nevis 33.6° , the temperature at the top being thus 17.6° higher than at Fort William.'¹ During these temperature inversions the air is remarkably dry at the summit, where the sun may be shining brightly, while

¹ A. Buchan, *Trans. R.S.E.*, vol. xliii.

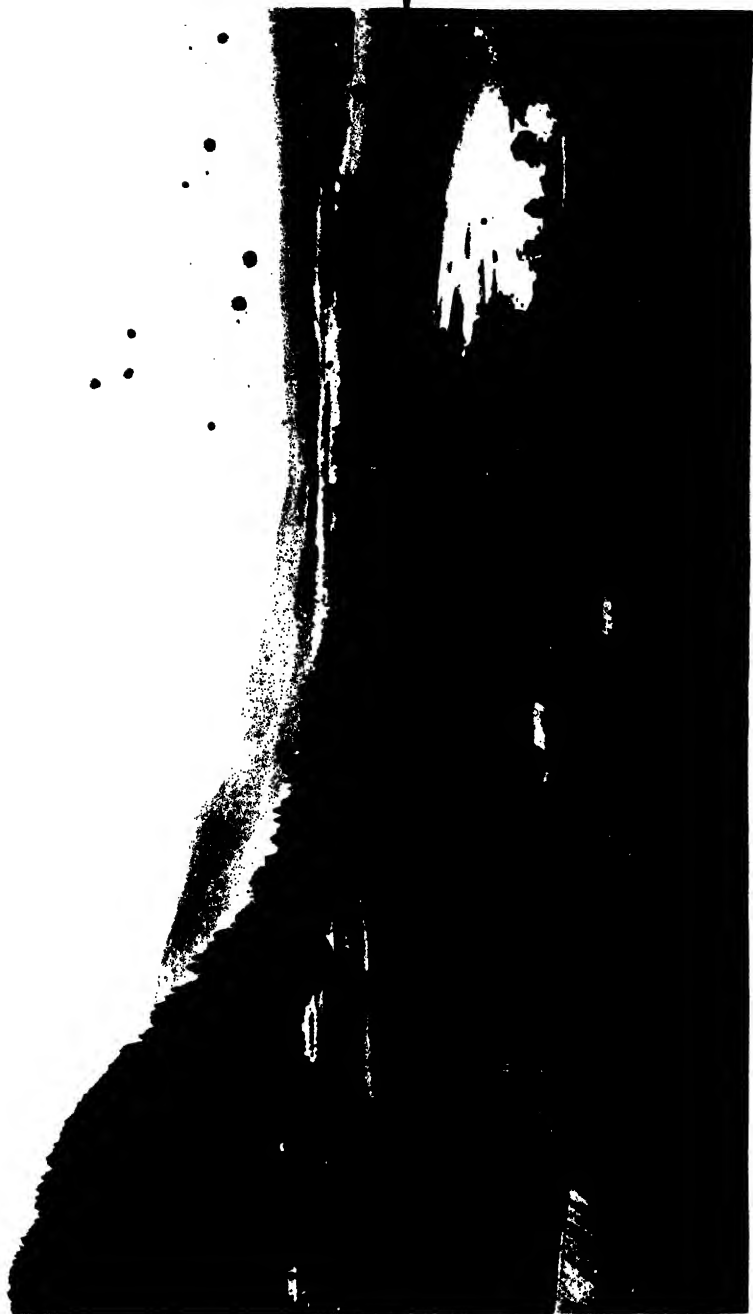


PLATE XXI. BRAEMAR, SCOTLAND

Phot. W. M. Spencer.



PLATE XXII. BEN NEVIS AND FORT WILLIAM
(Phot. Wilson Brothers)

CLIMATE

the inhabitants of the valley bottoms shiver in a damp raw air, often under cloudy skies which make the cold still more cheerless, and sometimes a thick fog completes the dismal picture; while the observers on the summit see the sunlight reflected from the white upper surface of the ~~ice~~ ^{snow} lying below them. At these times relative humidity readings as low as 15 per cent. have been recorded at the summit; no low-level station in the British Isles can show such low readings.

The rainfall is of course very heavy on the mountain tops: Precipitation and wind. Ben Nevis has just over 160 inches in the year; Fort William has just under 80 inches, this also far above the average of the British Isles. Sunshine is scanty, 758 hours per year on Ben Nevis, 1,119 hours at Fort William; even the lower station is decidedly sunless compared with the south of England. The summits are in the clouds more often than not only on thirty-one per cent. of the times observed (i.e. each hour of the day and night) was Ben Nevis clear of them; driving mist and drizzling rain are the usual conditions. pressure, Ben Nevis and Fort William.

The wind is so violent that at Ben Nevis Observatory a modification of the usual Beaufort scale of wind force had to be made to suit the conditions, and sometimes for nearly a week together it was unsafe for observations to be made in the open except by two observers roped together.

Snow falls throughout the year on the mountain tops, and lies continuously throughout the winter in drifts as much as twelve feet deep; it has usually melted by July. 'During the first winter (of the existence of the Ben Nevis Observatory) there was a period of 6 weeks when it was impossible to make the ascent; thick fog, strong winds and constant snowdrift effectually barred the way'¹ In the valley bottoms also snow falls in considerable quantity every winter and seriously interferes with traffic by road and railway.

¹ R. T. Omond, quoted in *Ben Nevis Meteorological Observatory*, Edinburgh, 1885.

Bibliography. The *Daily, Weekly, and Monthly Weather Reports* issued by the Meteorological Office, London, give a complete picture of our weather; mean values for the pressure, temperature, rainfall, and sunshine at numerous stations will be found in the appendices to these reports.

The annual volume and other publications of the British Rainfall Organization contain abundant information on the distribution of rainfall.

Numerous papers in the *Quarterly Journal of the Royal Meteorological Society*, and in the *Journal of the Scottish Meteorological Society*, deal with the climate of the British Isles. Special mention may be made of the article by Dr. Buchan on the mean atmospheric pressure and temperature of the British Islands, in the *Journal of the Scottish Meteorological Society*, vol. xi; this contains mean values for nearly 300 stations.

Forecasting Weather, by W. N. Shaw, F.R.S., D.Sc., published by Constable & Co., Ltd., 1911, has special reference to British weather.

'Our Weather', by J. S. Fowler, F.R. Met. Soc., and William Marriott, F.R. Met. Soc., in *The Temple Primers*.

Klimatologie, by J. Hann, 3 vols., deals with the climates of the whole world.

CHAPTER III

VEGETATION AND FLORA

By DR. C. E. MOSS

Extra-British distribution of British flowering plants.

OF the indigenous species of British flowering plants, all or very nearly all occur also on the mainland of Europe. The great majority occur throughout western Europe, a very large proportion in central Europe, a not inconsiderable number in eastern Europe, and some in western and central Asia. Some occur also in North America; and others again are cosmopolitan in the sense that they occur also in one or more of the land masses of the southern hemisphere.

A fair proportion of British plants are quite local in their occurrence within these islands; and a smaller number are local also in their general distribution. Whether or not any good species is endemic in the British Islands is doubtful. Wallace (1902,¹ pp. 360, et seq.) considered this matter, and was unable to indicate any undoubted species of flowering plants as endemic in

¹ References are to works quoted in the bibliography at the conclusion of this notice.

the British Islands. There are several varieties of British plants, however, which have not been found in other countries, and some of these are in all probability endemic.

Attempts, more or less successful, have been made to classify British plants according to their distribution. The best known of these are by Forbes (1846), and by Watson (1835, &c.). Watson's scheme has been usually followed by British botanists. Watson regarded British plants from the standpoint of their distribution in Great Britain alone. He did not deal with Irish plants, and took no note of the distribution of British plants in Europe. Such a scheme was necessarily artificial; but such as it was, as stated above, it was adopted generally in this country.

Classification according to distribution: Watson's scheme.

Plants which occurred throughout the length and breadth of Great Britain, Watson placed in what he called the *British type* of distribution; and this type includes such well-known species as the alder (*Alnus glutinosa*), the hazel (*Corylus avellana*), two species of heath (*Erica cinerea* and *E. tetralix*), and the primrose (*Primula vulgaris*) and cowslip (*P. officinalis*). Plants which have their head-quarters in England, become rarer as we proceed northwards, and are rare or absent in Scotland, belong to Watson's *English type*. The hornbeam (*Carpinus betulus*), the dogwood (*Cornus sanguinea*), and the yellow dead-nettle (*Lamium Galeobdolon*) belong to this class. Species whose head-quarters are in Scotland, and which are rare or absent in England, are placed in Watson's *Scottish type*, examples of which are the Scots pine (*Pinus sylvestris*, var. *scotica*), the tea-leaved willow (*Salix phylicifolia*), and the dwarf cornel (*Cornus sanguinea*). Later botanists have created an *Intermediate type*, to which belong plants which occur only in northern England and southern Scotland. This is a small but highly interesting class, to which the bird's-eye primrose (*Primula farinosa*) and the haneberry (*Actaea spicata*) belong. Some of the English species occur chiefly in eastern England, others chiefly in western England. The former belong to Watson's *Germanic type*, e. g. the oxlip

(*Primula elatior*), and the latter to his *Atlantic type*, e. g. two species of heath (*Erica vagans* and *E. ciliaris*). Of the Scottish species, some are more northern and more Alpine than others, and these constitute Watson's *Highland type*, and include such species as the dwarf birch

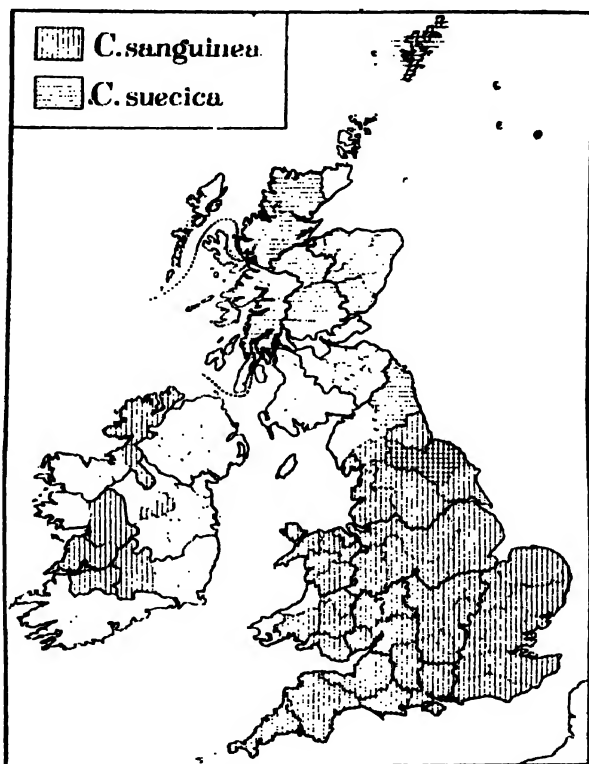


FIG. 38. Distribution of Species of *Cornus*.

(*Betula nana*), *Azalea procumbens*, and some small gentians and saxifrages. Lastly, a few plants are so rare and local that Watson did not venture to include them in any of the above types. The Cheddār pink (*Dianthus caesius*) is confined to one or two spots on the Mendip Hills, *Lloydia serotina* to one or two spots on Snowdon, and *Menziesia caerulea* to a single hill in Perthshire. Such plants Watson placed in his *Local type*. It would be easy

to criticize adversely this scheme of classification, and it is curious that the scheme met with such widespread approval among British botanists.

Forbes's scheme was superior to Watson's in that it took into account the whole of the British Isles, and paid ^{Forbes's} scheme.

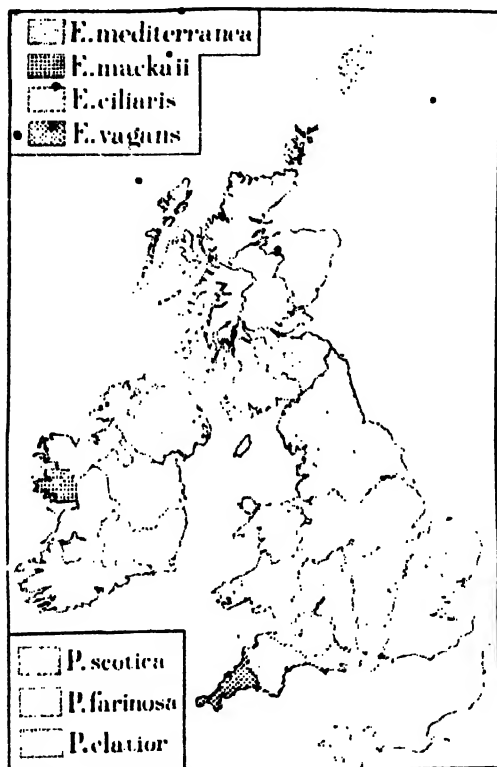


FIG. 39. Distribution of Species of *Erica* and *Primula*.

regard to the distribution of British plants in foreign countries. Forbes's first class included what may be termed the *West-Irish type*. It is a small class, including plants whose occurrence in the British Isles is confined to western Ireland. Several species of saxifrage are included, such as *Saxifraga umbrosa*, *S. hirsuta*, and *S. Geum*. A few members of the heath family (*Ericaceae*) belong to the same class, namely *Erica mediterranea*,

E. Mackaïi, *Daboecia polifolia*, and the strawberry tree (*Arbutus Unedo*). Of other members of this class, a species of butterwort (*Pinguicula grandiflora*) may be mentioned. Forbes's second class included plants which occur in south-western England and south-eastern Ireland. Examples are: a buttercup (*Ranunculus ophioglossifolius*), the white rock-rose (*Helianthemum polifolium*), a St. John's wort (*Hypericum linearifolium*), an umbelliferous plant (*Physaspermum cornubiense*), and a lobelia (*L. urens*). The above are confined to southern, chiefly south-western England, while the following occur both there and in south-eastern Ireland: a stock (*Matthiola sinuata*), madder (*Rubia peregrina*), a snap-dragon (*Antirrhinum Orontium*), *Sibthorpia europaea*, and a small gentianous plant (*Cicendia filiformis*). These two classes overlap a great deal; and Præger (1909) has rightly joined them, naming the united class the *South-western European group*. To the preceding may be added a small but highly interesting class of plants which is termed the *American group*. Of members of this class a small iridaceous plant (*Sisyrinchium angustifolium*) extends from Kerry and Cork northwards to Sligo and Fermanagh; elsewhere it is indigenous only in North America. The pipewort (*Eriocaulon septangulare*) occurs from Kerry to Donegal, reappearing in the Hebrides; and elsewhere known only in North America. *Najas flexilis* is found in Kerry and Galway, in a few places on the mainland of western Europe, and elsewhere only in North America. An orchid (*Spiranthes romanzoffiana*) is found in northern and southern Ireland, and elsewhere only in North America. To these may be added the common ling or heather, which is widespread in western Europe, and spreads to the north-eastern United States by way of Iceland, southern Greenland, and Newfoundland. Here too should be mentioned a few maritime species which stretch from the shores of Dorset and Hampshire, through Sussex, Kent, and Essex, to Suffolk and Norfolk. Formerly some of these species occurred in Lincolnshire. The members of this class include a glasswort (*Salicornia perennis*),

.VEGETATIO!

a sea-blite (*Suaeda fruticosa*), a sea-lavender (*Statice bellidifolia*), and the sea-heath (*Frankenia laevis*). Forbes's third class comprises species which occur in south-eastern England, especially on Chalk, and includes the following: *Linum perenne*, *Phyteuona orbiculare*, *Verbascum pulverulentum*, and *Anemone Pulsatilla*. Plants of mountain summits Forbes placed in his fourth class. This includes *Lloydia serotina* (confined to Snowdon), *Draba rupestris*, *Lychnis alpina*, *Astragalus alpinus*, *Saxifraga cernua*, *S. rivularis*, *Arctostaphylos alpina*, *Phyllodoce caerulea*, *Azalia procumbens*, *Gentiana nivalis*, *Myosotis alpestris*, *Veronica alpina*, *Salix reticulata*, *S. herbacea*, *Betula nana*, and several species of *Juncus*, *Luzula*, and *Carex*. Forbes's fifth class includes the general flora of the British Islands, such as the daisy (*Bellis perennis*), primrose (*Primula vulgaris*), buttercup (*Ranunculus acris*), and several common shrubs, e.g. the hazel (*Corylus avellana*), and trees, e.g. the oak (*Quercus robur*).

Forbes realized that in his day there was much to be discovered regarding the distribution of the British Isles; and it is true that later discoveries have rendered both Watson's and Forbes's systems more or less incomplete. Still these pioneers led the way to a really rational way of regarding the British flora; and Forbes, in particular, taught botanists that the British flora cannot be properly understood without taking into consideration the flora of the mainland of Europe.

From what has been said, it will be seen that we regard Forbes's classification as one which forms a suitable basis on which to form a classification grounded on present-day knowledge. In such a modern classification three main groups may be recognized; each of these, of course, is capable of further subdivision. The three main groups may be termed (1) the *Arctic-Alpine group*, (2) the *Western group*, and (3) the *Eastern group*.

It is customary in more recent discussions on the distribution of plants to have regard to the migrations of species, and further classifications of species, from the

Modern
classification.

standpoint of distribution, will no doubt be based on the views which botanists take up of these plant migrations.

With regard to the British Isles, the adoption of this point of view is comparatively easy, for a definite starting-point is indicated by the Glacial Period, during which time the earlier flora of this country was probably either wholly or in great part exterminated.

During the Tertiary Period, we know that the British Isles were inhabited by plants which demanded a much warmer climate than is found in the country to-day, a climate which must have been at least as warm as that of the present climate of the Mediterranean region. As the Glacial Period was approached, the climate became cooler and cooler, until in immediately pre-glacial times the fossil plants which have been found are such as occur to-day in England and in central Europe (Reid, *op. cit.*).

Effects of
the Glacial
Period.

Many authorities believe that during the Glacial Period the cold was so intense that the flora and vegetation of this country was completely or almost completely wiped out. Mr. Clement Reid (1899; 1911) takes up this position, and it seems to us to be reasonable. However, there are not lacking authorities (e. g. Forbes and Præger) who prefer to believe that certain elements of the British flora persisted throughout the Glacial Period, and may thus be regarded as relics of the Tertiary flora.

Clement Reid maintains that during the period of the greatest intensity of cold, all Scotland, all Ireland, and the greater part of England and Wales were buried under ice and snow, except perhaps in the case of some high peaks on which a few Arctic-Alpine species survived. Whether, however, Arctic-Alpine species occurred in these localities before the occurrence of the Glacial Period is not proved, for, as above stated, the species which Clement Reid has found in British pre-glacial deposits are all such as might be expected to occur to-day in the lowlands of England. In fact, with two or three exceptions they do actually occur to-day in lowland localities; and the two or three exceptions are not Arctic-Alpine species anywhere, but occur on the mainland

of Europe in lowland situations at the present time. It is probable, therefore, that the modern British representatives of the above British pre-glacial species are the descendants of a post-glacial immigration and not of the pre-glacial plants.

It is true that in the south of England, from the mouth of the Thames to the south of the Severn, there is no evidence of any ice-cap: and even further north, as on the summits and eastern slopes of the southern Pennines, there were certain areas which were probably always free of glaciers (Moss, 1913); but the climate of even these non-glaciated localities was no doubt so Arctic in its severity that none but Arctic-Alpine species could withstand it, and it has been pointed out that there is no positive evidence to hand of the occurrence of such species in this country in pre-glacial times. As indicating the severity of the climate of the Glacial Period in the south of England and Ireland, Clement Reid (1911) points out that the icebergs breaking away from the Irish coast were able to float across to the Scilly Isles before melting, as is proved by the numerous striated stones which are now found on the highest parts of these small islands. Not only was this the case, but remains of the Arctic-Alpine birch (*Betula nana*), and some mosses of similar distribution, which probably entered the country near the close of the Glacial Period, have been found in the alluvial deposits of the Teign Valley, now one of the warmest spots in the whole of Great Britain.

In view of these facts, the view put forward by Forbes (loc. cit.) and still supported by certain botanists, that the local species of our Western group in Ireland are survivors of the Tertiary flora, seems unreasonable. The species alluded to are those of Forbes's first class, enumerated on p. 95. Clement Reid's view of these species, that they are the result of a post-glacial immigration, seems to us to be more nearly in accord with the ascertained facts than the view that they are relics of the British Tertiary flora.

On the retreat of the ice northwards, the country was probably first taken possession of by Arctic-Alpine species, Tundra
Period.

like the dwarf birch mentioned above, whose distribution at this time was probably widespread and general throughout Europe. They doubtless spread northwards from certain non-glaciated areas of southern Europe and central Asia, where they had existed throughout the Glacial Period. As before indicated, it is not certain that this migration was reinforced by any British pre-glacial Arctic-Alpine species, for it is not known whether or not any such species ever existed.

It is possible that these Arctic-Alpine species entered the British Isles by two distinct paths, one of which was southern—giving rise, for example, to the Teignmouth colony of the dwarf birch (*Betula nana*)—and one of which was northern. The southern invasion was no doubt earlier than the northern one, for it is clear that the Glacial Period persisted much longer in Scotland than in England. The southern invasion is doubtless responsible for the members of our Arctic-Alpine group which occur on the mountains of central Europe but not in northern Europe, such members, for example, as *Carex frigida*; and the northern and later invasion is responsible for those members of the same group which occur in northern but not in central Europe, such as, for example, *Salix lanata*. Most of the members of this Arctic-Alpine group occur in both northern and central Europe, and at present it is in many cases difficult if not impossible to decide to which of the two invasions they owe their existence in the British Isles.

This period, when the whole of this country and even of central Europe was occupied by Arctic-Alpine species, is spoken of by Nehring (1883 : 1890) as the Tundra Period. It is reasonable to suppose that such a period followed the Glacial Period, for at the time in question the climate, although gradually improving, would still be cold: the soil would be wet, cold, and elutriated: and the time for plants of a warmer period was not yet.

Remains of plants of this Tundra Period are found at the base of certain Scottish peaks, as shown by the results of investigations by Lewis (1905-7). It is interesting

that many of the Arctic-Alpine species found by Lewis in this layer are such as are found growing to-day on peat in sub-Alpine localities in Scotland. The species include *Salix herbacea*, *S. arbuscula*, *Betula nana*, *Arctostaphylos alpina*, and *Sedum rhodiola*. Just as in certain parts of the present-day Arctic tundra, alternating pools occur with aquatic plants which harbour such non-Arctic species as *Ranunculus repens*, *Viola palustris*, *Menyanthes trifoliata*, and *Potamogeton pectinatus*, so the results of Lewis's work prove this to have been the case in Scotland during this Tundra Period.

Lewis's results indicate that the Tundra Period was followed by an immigration of certain forest trees, such as the birch (*Betula pubescens*), the hazel (*Corylus avellana*), and the alder (*Alnus glutinosa*), accompanied by such temperate shrubs as *Salix purpurea* and such temperate woodland herbaceous plants as the bugle (*Ajuga reptans*) and the red campion (*Lychnis dioica*).

Doubtless there were, in Scotland at least, fluctuations of the ice, which, whilst it retreated on the whole, made a few more or less pronounced advances during the general retreat, and which have given rise to a belief in alternating, inter-glacial, warm and cold periods. These fluctuations perhaps explain the occurrence of a second layer of Arctic-Alpine species, above the lower forest layer, with which occurred, as in the case of the first Arctic-Alpine layer, temperate marsh and aquatic species.

The two layers of Arctic-Alpine species and the inter-Steppe mediary layer of forest species must be included in the Tundra Period of Nehrung referred to above. It is Nehrung's belief that this Tundra Period was in central Europe, at least, succeeded by a Steppe Period, when warmer and drier conditions held sway. There is, however, no certain evidence that these steppe conditions spread so far east as the British Isles. Dr. J. E. Marr (see Tansley's *Types of British Vegetation*, 1911, p. 97) believes, however, that there are indications of Nehrung's Steppe Period in East Anglia, and instances some members (e. g. *Veronica verna*, *Artemisia campestris*, *Medicago*

falcata, and *Silene otites*) of the interesting flora of the loose, sandy soils between Thetford and Mildenhall as being possible survivors of this Steppe Period.

In any case it is practically certain that the Steppe conditions did not extend to the west of the British Isles ; but we are justified in believing that this warmer and drier period was represented in this country by an immigration of the species which constitute our eastern group, and many of which are characteristic of species of the continental climate of central and eastern Europe. species which at present occur chiefly on the sandy and chalky pastures of southern England. Such plants, as might be expected, are absent from the plant remains preserved in peat ; and none of them is cited by Lewis as occurring in the Scottish peats which he has investigated. The rare orchids of south-eastern England (e.g. *Orchis purpurea*, *O. militaris*, *O. simia*, *O. hircina*), and such plants as *Phyteuma orbiculare*, perhaps entered the country at this time, along with the species (quoted above) which are now confined to the heather of East Anglia. These heaths are remarkable as occurring on the driest soil, and in a region with the lowest mean annual rainfall and with the lowest average atmospheric humidity of any district in the British Isles ; and the combination of these circumstances, coupled with the nature of the present vegetation, seem to justify the conclusions that the dry sandy soils between Thetford and Mildenhall have never been tree-clad except in the immediate vicinity of the streams. It is not improbable that the majority of the species of our eastern group entered the country during the Steppe Period of central Europe.

Forest
Period.

According to Nehrung, the Steppe Period was followed by a Forest Period. This period is reflected in the plant remains of all old British peats, and corresponds, in a general way, with the second or upper forest layer of Lewis. In many southern peats, as in the Peak District and in the Cleveland District, this is the only forest layer which has been discovered (cf. Moss, 1904 and 1913, and Elgee, 1913). In this period the same trees and shrubs

occur as in the first or lower forest layer (see above); and, in addition, the Scots pine (*Pinus sylvestris*) also occurs. The remains of this tree in the peat prove it to have once been of fairly general occurrence throughout the British Isles. At present, as an undoubtedly indigenous species, it is almost confined to the Caledonian Forest, where it is still dominant in woods at Rothiemureus and in the adjoining Glen More, near Aviemore.

The form of the Scots pine in these localities is different from that of the heaths of southern England. The southern form of *Pinus sylvestris* may indeed represent, as far as it is an indigenous species, a different invasion from that indicated by the northern form.

In the British Isles, it is probable that the Steppe Period was not sharply marked off in time from the Forest Period. It is probable that while the Continental Period held sway in eastern England, the Forest Period was beginning in the south-west, and that at this time the immigration of the species of our western group was actually in progress. This supposition does not really conflict with Nehring's views, for it would be unreasonable to suppose that the conditions described by Nehring as occurring in central Europe would be reflected in all details in the more insular climate nearer the Atlantic Ocean.

During the height of the Forest Period, the British Isles were characterized by the widespread occurrence of natural forests, of which to-day it is possible to trace only the meagre remains. At the present time, there are practically no stretches of close natural woodland on the Pennines higher than about 300 metres, and practically no indigenous trees higher than about 380 metres. Lewis, however, finds abundant remains of trees and tree associates in the peat of Cross Fell at about 800 metres; and the writer has observed remains of trees in the peat of the southern slopes of the Peak at 600 metres. In spite, however, of the meagreness of our present-day forests, it is possible, by a close study of such as exist, to form a mental picture of the condition of the British Isles during the maximum development of forests.

Distribu-
tion and
character
of forests:
on allu-
vial soils,

1. The alluvial deposits were probably occupied by forests of willow (*Salix alba*, *S. fragilis*, *S. purpurea*, &c.), alder (*Alnus glutinosa*), and ash (*Fraxinus excelsior*). These forests have suffered destruction to a greater extent than any of the following types, owing to drainage and subsequent pasturing. Several trees, which are now confined to river banks and the margins of marshes and fens, were probably constituents of these ancient alluvial forests or occurred on their upland margins; examples of such trees are the grey poplar (*Populus canescens*), the black poplar (*P. nigra*), the white willow (*Salix alba*), the crack-willow (*S. fragilis*), some osiers (e.g. *S. purpurea*), and some elms (*Ulmus nitens*, *U. sativa*, and *U. campestris*).

on sandy
soils.

2. The dry sandy soils were probably covered by forests of oak (*Quercus robur* and *Q. sessiliflora*), beech (*Fagus sylvatica*), birch (*Betula alba*, *B. pubescens*), and pine (*Pinus sylvestris*): and as in western Europe generally (Graebner, 1901), these forests have largely degenerated into heaths. The extensive heaths on the Greensand soils of south-eastern England have most probably had this origin. As for the heaths on the peculiarly light soils of western Norfolk and Suffolk, it has already been pointed out that there is some ground for the belief that they have never been tree-clad at all, except in the immediate vicinity of streams.

Oak and
birch
forests
of hilly
districts.

3. The soils over the older Siliceous rocks of the country were doubtless dominated by forests of oak (*Quercus sessiliflora*), remains of which are locally abundant in most of the hilly districts of western and northern England and of southern Scotland.

4. At the present time, these oak forests cease at an altitude of about 300 metres; but it is almost certain that in prehistoric times they ascended at least to 400 metres. Forests of birch (*Betula pubescens*) no doubt existed at a still higher altitude than the oak forests; and it is usual, even to-day, to meet with the rather

¹ For a fuller account of the 'Woodlands of England', see Moss, Rankin, and Tansley (1911).

meagre remains of such forests above the existing oak forests. During the height of the Forest Period these birch forests were of enormous extent, and ascended to much higher altitudes than they do at present, as is clearly proved by the existence of the remains of the tree in, and especially at the base of, the peat of many peat moors. The birch forests have suffered destruction from two causes. On the one hand, many have been overwhelmed by peat moors, sometimes owing to a secondary and a modern extension of peat moors over the woodland site and sometimes to the growth of modern peat initiated and continued within the forests themselves.

On the other hand, on habitats unsuited for the growth or spread of peat, the trees have become scarcer, partly from natural causes, and partly from artificial deforesting and pasturing; and in such places, an open birch scrub with a grassy undergrowth results. The scrub itself degenerates in time to pure grassland.

Similarly the oak forests of the older siliceous soils degenerate into scrub and finally into grassland; and the vast stretches of grassland which to-day characterize the majority of the hill and mountain slopes of the British Isles have originated in the way above indicated.

A curious secondary phenomenon is seen on many of these siliceous hill-slopes. The bracken (*Pteris aquilina*) has persisted from the original oak and birch forests; and it is not ill adapted to the life-conditions of the resulting grassland where this is not too exposed or too damp. The presence of the bracken in quantity seriously detracts from the value of the grassland as pasturage; and as the plant seems to be gradually increasing its range over these grasslands, spreading largely by means of its underground rhizomes, the problem of its extirpation is in some districts of no little economic importance.

5. Aboriginal pine forests are at the present time limited to north-eastern Scotland, where, however, they are locally extensive, as in the forests of Rothiemureus and Glen More, near Aviemore. The pine of these forests is the true Scots pine, and differs in some points from the

pine of the forests of the Greensand hills of south-eastern England. Just as the latter forests have, as above indicated, largely degenerated into typical heath, so the former have largely degenerated into heather moors.

Beech
forests.

6. Of a very different aspect from any of the preceding are the beech forests of the slopes of the Chalk hills of south-eastern England. Under the dense shade of the beech (*Fagus sylvatica*) few plants will grow; and instead of sheets of bluebells (*Scilla non-scripta*) or primroses (*Primula vulgaris*), or the sprinkling of other woodland species, the beech woods present a carpet of fallen leaves among which grow a few saprophytes (e.g. the bird's nest (*Monotropa hypopitys*) and the bird's nest orchid (*Neottia nidus-avis*), and very few green plants. Again, whilst oak woods are invariably characterized by a layer of shrubs, these plants are usually absent from beech woods or confined to their better-lighted margins.

A characteristic member of the beech forests is the yew (*Taxus baccata*), a tree which casts even denser shade than the beech. Here and there, on the Chalk downs, the beeches have all died or have been removed, and the yews are left standing; and thus local yew woods occur in the natural area of the beech woods.

The beech woods, however, usually degenerate into scrub, in which the white beam (*Pyrus aria*), the cherry (*Prunus avium*), and the sloe (*P. communis*) are often abundant. A still later stage of retrogression is seen in the extensive grasslands which at the present time characterize most of the Chalk downs of southern England. These Chalk grasslands furnish more valuable pastures than the siliceous grasslands which result from the retrogression of the oak and birch forests, as the former are dominated by the more succulent sheep's fescue grass (*Festuca ovina*), and the former by the coarser mat grass (*Nardus stricta*), silver hair grass (*Aira flexuosa*), and blue moor grass (*Molina caerulea*).

Ash
forests.

7. The slopes of hill composed of fissured limestones were formerly co-extensive with forests of ash (*Fraxinus excelsior*); and the remains of these forests are still



PLATE XXIII. KEEF HILL, NEAR HIGH WYCOMBE, CHILTERN HILLS, ENGLAND

(Phot. W. M. Spencer)



PLATE XXIV. SHANKLIN CHINE, ISLE OF WIGHT
(Phot. O. J. R. Howarth)

characteristic of the Carboniferous and Oolitic Limestones of Somerset (Moss, 1907), and of the Carboniferous Limestone of the Peak District (Moss, 1913). The ash forests from the standpoint of the abundance of shrubs and ground species, are richer than any other type of forest found in the British Isles. These forests degenerate into scrub, and later into grassland; and the grassland which has resulted from the decay of the ash forests furnishes a type of vegetation which is extremely closely related to the grasslands of the Chalk downs. The limestone grasslands of Yorkshire, for example, are more valuable for pasturing purposes than any other type of natural or semi-natural grassland in the north of England.

8. Those lowland parts of the country characterized by deep clayey soils were formerly covered by extensive forests of oak (*Quercus robur*). Most of these have been artificially destroyed, and converted into arable land or permanent pasture, but isolated patches of oak woods are still dotted about the area, and owe their continued existence to the love of sport which characterizes the youth and manhood of the English middle and upper classes. These oak woods on clay are the favourite habitat of the primrose (*Primula vulgaris*), and of many other woodland flowers. The shrubs are usually coppiced every 10 or 15 years; and the cut branches bring in a small revenue to the owner or tenant; but it is owing to their value as nesting grounds for game, particularly pheasants, that these oak woods are left undisturbed. There can be little doubt that, like British forests in general, the oak woods degenerate into scrub and grassland; but as the soil on which they occur is valuable agriculturally, natural scrub and natural grassland on clayey soils are rare, and are only feebly represented by the village greens which occur in the original area of oak forests on clay.

9. A somewhat different type of forest characterized the deep marly soils which differ from clayey soils only in having a higher mineral content. Such soils were covered by ash-oak forests—forests intermediate in com-

Oak
forests
of clay
lowlands.

Ash-oak
forests of
marly
lowlands.

position between the ash forests of the fissured limestones and the oak forests of clays. They occur, like the oak woods, in lowland and highly cultivated districts, and owe their continued existence precisely to the same causes as do oak woods. Degenerate scrub and grassland, resulting from the decay of these woods, are rare, for the marly soil is the most valuable, agriculturally, of any soil in the country; and therefore almost every available acre of it is under high cultivation. Woods of this type are not uncommon on the Jurassic marls of Somerset and Cambridgeshire. They are usually coppiced, like the oak woods; and they are richer than the latter in scarce shrubby and herbaceous species. One of the last deserves special mention, namely the oxlip (*Primula elatior*), a beautiful species which adorns many of the ash-oak woods of Essex and Cambridgeshire.

Overlap-
ping of
periods.

We have spoken of the Tundra Period, the Steppe or Continental Period, and the Forest Period; but it must be again emphasized that, so far as the British Isles are concerned, these periods are less definite than appears to have been the case in central Europe. For example, some parts of the British Isles appear to have experienced a comparatively short Forest Period and to have been speedily reconquered by the Tundra Period. Only on this hypothesis can we explain thick and extensive deposits of peat which cover many of the comparatively low hills of the northern and western parts of the British Isles. Thus in this country, particularly in the west and north, there was a certain amount of overlapping of the Tundra Period and the Forest Period, whilst the Steppe Period appears to have been unrepresented except perhaps in the east.

Peat
moors.

In many parts of the British Isles, as Lewis and Moss have observed, the peat moors are in a state of rather rapid decay, but this phenomenon is by no means universal; and Elgee (1912) points out that the peat moors of the Cleveland District of Yorkshire are quite stable at the present time. Again, in many parts of the

country peat is now in active formation, as on many peat moors in hilly (as opposed to mountainous) districts, and also in many lowland districts, as round the edges of the Norfolk broads and the Cheshire and Shropshire meres.

In some European countries peat is utilized on a comparatively large scale. Russia is said to produce 4,000,000 tons annually, Germany 2,000,000, and Holland and Sweden 1,000,000 tons each; and extensive tracts of peat are still unutilized. Europe is said to contain 212,700 square miles of peat, Canada 30,000,000 acres, and the United States 20,000,000 acres (Drachnowski, 1912); but much of this is only valuable as agricultural land, and as such only when properly drained.

The decline of the Forest Period is not confined to the British Isles, but is well known to plant geographers in most parts of the world; and much speculation has been indulged in as to its cause. It is usual to attribute the decline of the forests to artificial causes, to pasturing, to fire, to actual felling of trees with no subsequent replanting; and there can be no doubt that these are *verae causae*. However, many authorities deem these causes insufficient in themselves and look for deeper and more natural causes operating along with them. Some Swedish authorities think there has been a gradual change from a damper to a drier climate, and that this change has been reflected in a gradual lowering of the forest limit on the mountains of Scandinavia. Moss (1913) points out that as the soil of woods becomes more and more covered by deep acidic humus the conditions become more and more unfavourable for the germination of the seeds of certain trees, and that the larger of these seeds find it impossible to colonize tracts of closed vegetation on the forest floor. Whatever be the causes, there is no doubt that the forests of the present day are, on the whole, in a period of decadence. Retrogressive stages of scrub are frequent, and the retrogressive scrub degenerates into grassland. Thus it would appear that the vegetation of the earth is passing out of the Forest Period, and that it is entering a Grassland Period.

Cause of
decline of
forests.

Space forbids our completing this sketch of the history and nature of the British flora vegetation with an adequate account of the detailed plant communities which have been recognized by British phytogeographers in recent years; but a short summary of these plant communities is here given. Further accounts may be found in the works, cited below, of Crampton, Lewis, Moss, Præger, Rankin, R. Smith, W. E. Smith, and Tansley.

Summary
of plant
communities.

I. *Plant Communities of Fresh Waters*.—These are subdivided into smaller communities of stagnant waters, of slowly moving waters, and of quickly flowing streams.

II. *Plant Communities of Salt and Brackish Waters*.—These yield small communities of sea-weeds, submerged marine flowering plants, and marine and tidal reed-swamps.

III. *Plant Communities of Salt Soils*.—These furnish different types of salt marshes and the vegetation of spray-washed rocks.

IV. *Plant Communities of Sand Dunes and Shingle Banks*.

V. *Plant Communities of Dry, Sandy, and Gravelly Soils*.—Here occur woods of beech, oak, birch, and pine with degenerate scrub and grassland.

VI. *Plant Communities of Heaths*.—Most of these have resulted from the degeneration of the woods of the preceding class.

VII. *Plant Communities of the Older Siliceous Soils*.—Examples of such plant communities are birch woods and oak woods with degenerate scrub and siliceous grassland.

VIII. *Plant Communities of Clayey Soils*.—Such as damp oak woods which are usually coppiced.

IX. *Plant Communities of Calcareous Soils*.—(a) On chalk rock, beech woods with retrogressive and local yew woods occur, with corresponding scrub and chalk pasture. (b) On the fissured limestones, ash woods and ash-oak woods occur, with corresponding scrub and limestone pasture.

X. *Plant Communities of River Alluvia*.—Liable to periodical inundations. Such tracts were formerly tenanted by alder and willow woods, most of which have now been destroyed by drainage and subsequent pasturage.

XI. *Plant Communities of Alkaline Peats*.—Such peaty soils furnish the fens of East Anglia, most of which have been drained.

XII. *Plant Communities of Acidic Peats*.—These furnish the numerous types of moors which are still very extensive in the western and northern parts of the British Isles.

XIII. *Plant Communities of Alpine Summits and Crags*.—These occur at altitudes usually above 3,000 feet, but the

richer examples are rather local. The best-known examples occur on the Breadalbane Mountains in north Perthshire, particularly on Ben Lawers.

XIV. Plant Communities of Cultivated Land.—The cultivated land of the country is not directly of interest to the pure botanist; most of the natural plant communities mentioned above, with the exception of No. XIII, have a certain amount of economic value as such, but most of them have been largely destroyed and converted into cultivated land. The cultivated land of the country varies from place to place, and the student of vegetation is usually able to form a mental picture of the original vegetation by particular features which the cultivated land still presents. The weeds of arable land, the plants of small patches of marsh and aquatic vegetation, and the roadside plants, vary on different soils, and are indications of the nature of the vegetation before the land was placed under cultivation. In the chapter on *Agriculture*, later in this volume, the present nature of the cultivated land and its relations to the conditions of soil and climate are discussed.

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CHAPTER IV

FAUNA

By GEOFFREY W. SMITH

Poverty
of native
fauna.

THE British Isles are typical examples of what A. R. Wallace has called continental islands, i.e. islands which in comparatively recent times have formed part of a continent. The channels stretching between the British Isles and the continent of Europe are nowhere as much as a hundred fathoms in depth, and there is no doubt that at certain periods during the Pleistocene Age there was free communication on dry land with the European mainland. It is, therefore, not surprising that the fauna is practically the same as that of the mainland, and that there is no species of mammal peculiar to the British

Iles which is not also found on the continent, and only one peculiar species of bird, the grouse, *Lagopus scoticus*.

A fact which calls for more explanation is the extreme poverty of the British fauna, compared with the continental; thus Great Britain has some forty species of land mammals as against Germany's ninety and Scandinavia's sixty, while Ireland has only twenty-two. In reptiles and amphibia a small country like Belgium has about twenty-two species, while Great Britain has thirteen and Ireland only four, of which none are snakes.

This extreme poverty has been accounted for by the destruction caused by the glacial epoch during Pleistocene times, and to some extent by the subsidence and flooding of the country which occurred during this epoch. Authorities differ as to the completeness of this destruction, some holding the opinion that practically all animal life was destroyed when the glaciation reached its maximum, and that our present fauna arrived from the continent as immigrants after the greatest intensity of cold was passed; others affirm that the destruction was not complete, and that the present fauna are the descendants of those species which were able to withstand the cold of the glacial epoch.

The
Pleistocene
fauna.

However this may be, we know that in pre-glacial times our islands were peopled with a great assemblage of mammals, many of which have now totally disappeared from the earth or else are found in distant tropical lands, and that many of these animals continued to survive during the Pleistocene Age after the succession of glacial periods had begun. In the brick-earths and cavern-deposits of Britain, which were probably formed in an inter-glacial period, we find a strange mixture of mammalian remains which do not give any clear evidence as to the nature of the climate when they were deposited. Of these animals, the reindeer, Arctic fox, and musk-ox suggest an Arctic climate, while the hippopotamus, sabre-toothed tiger, lion, and hyaena are equally suggestive of a tropical one. The variety of the British fauna at this time was further reinforced by the occurrence of bears, the glutton, the

woolly rhinoceros, the aurochs, bison, saiga antelope, and two species of elephant, the mammoth (*Elephas primigenius*) and the straight-tusked elephant (*E. antiquus*). Whether the rigour of the climate or submergence of a large area of their feeding-grounds was responsible for the wiping out of this fauna towards the close of Pleistocene times, it may be pointed out that most of the above-mentioned forms have also disappeared from the continent of Europe, so that the influence was not a local one.

Historic
times.

Coming to historic times we may note that the poverty of the British mammalian fauna has been increased within these times by the disappearance of the wolf, the brown bear, the beaver, the wild boar, and, at any rate as a wild animal, the wild cattle. According to J. E. Harting, the brown bear (*Ursus arctus*) was found in Great Britain up to the tenth century; in Roman times the Caledonian bear was exported to Rome for the amphitheatre. It appears that the wolf (*Canis lupus*) is not mentioned as occurring in England after the reign of Henry VII, but in Scotland and Ireland a few survived until the middle of the eighteenth century. The beaver (*Castor fiber*) was extinguished much earlier. Giraldus Cambrensis in his account of a journey through Wales in 1188 remarks on the beavers of the River Teifi in Cardiganshire, and it appears that at this time it only existed in small numbers in a few localities in Wales.

There are, of course, abundant records of the wild boar (*Sus scrofa*), as this animal was hunted by the Britons, Romans, Saxons, and Normans in succession; it became extinct during the seventeenth century, despite several attempts to reintroduce it. The position of the wild white cattle (*Bos taurus*), which is still represented in existing herds, e.g. the Chillingham cattle, is doubtful; some maintain that they are the lineal descendants of the wild forms which undoubtedly existed with prehistoric man in Britain, and were described by Caesar, others holding that they were introduced from the continent at a remote epoch and subsequently became feral. An intermediate view, with much to recommend it, is that

they are descended from the native wild cattle with some admixture with subsequently introduced breeds.

The existing mammalian fauna comprises bats (12 Mammals species), the hedgehog, mole, shrews (3 species), wild cat, fox, pine-marten, polecat, stoat, weasel, badger, otter, squirrel, mice (5 species), black and brown rat, voles (3 species), common and mountain hare, rabbit, red deer, fallow deer, and roe deer.

Ireland has only six species of bats, and lacks the mole, common and water shrew, wild cat, polecat, weasel, dormouse and harvest mouse, the voles, the common hare, and the roe deer. The wild cat is now on the verge of extinction, and the pine-marten and polecat are equally rare, though the former has been recorded from Ireland in recent years.

The mountain hare, which also is found in Northern Europe and again in the Alps, Pyrenees, and Caucasus, does not occur in England, but is abundant in Ireland and Scotland. It is characterized by the fact that in winter its fur usually changes to pure white with the exception of the points of the ears, which remain black. There is great variability in the extent of this change, according to climate, and in Ireland it does not occur at all.

The red deer (*Cervus elaphus*) still exists as a wild animal in parts of England (Somersetshire and Devonshire), in Scotland and Ireland. The fallow deer (*Cervus dama*) is not a true wild British species, but was introduced probably by the Romans, and since then has become feral. This is also the case with the rabbit, whose home is the Western Mediterranean. The roe deer (*Capreolus caprea*) is unknown in Ireland, but it is indigenous in Scotland and the north of England, and occurs as a practically wild species.

The fact that Ireland lacks several species of mammals and reptiles which occur in England and Scotland has been partially explained by reference to the greater depth of the Irish Sea as compared with the German Ocean; this greater depth being held to indicate that the land connecting Ireland with Great Britain was of a small extent

and of less duration than that connecting the latter with the Continent.

Birds.

We have already stated that there is a single bird, the red grouse (*Lagopus scoticus*), which must be considered as a good species peculiar to the British Isles. This bird, which abounds in Scotland, Ireland, the north of England, and Wales as far south as the mountains round Abergavenny, differs in several points from the willow grouse of Scandinavia, and most markedly in the fact that it does not assume a white winter plumage, but, on the contrary, becomes rather darker. Of other birds, the coal-tit and long-tailed tit exhibit constant and marked variations from the continental type, but they are hardly of sufficient importance to warrant their separation as distinct species.

Our native wild birds, owing partly to the protective laws which have secured for them a greater degree of immunity against the advance of civilization than in most continental countries, offer a richer and more attractive field to the outdoor naturalist than the mammalia, but even among them we may note the gradual extinction of many species within quite recent times. The larger birds of prey, such as the marsh and hen harrier and the buzzard, are now exceedingly rare, and the golden eagle is practically confined to the Scottish Highlands. Many of the warblers which visit this country only in the breeding season, have become very scarce owing to the drainage of fen country which used to furnish their favourite haunts. The most decorative birds of our avifauna are the golden oriole, the hoopoe, and the kingfisher, but persistent persecution has prevented the two former, which are spring migrants, from establishing themselves, so that they are now exceedingly rare visitants. The kingfisher, owing to its secretive habits, is still common in many districts, even in the close neighbourhood of towns.

Of birds now extinct we may mention the handsome great bustard, which used to breed freely in England until the early part of the nineteenth century, but is now a very rare and occasional visitor.

The freshwater fish of the British Isles offer some **Fresh-water fish.** features of interest, as there are a number of peculiar local species. The various forms of trout, which differ according to locality and their opportunities for visiting the sea, have been ascribed to a large number of species, but modern authorities agree that they should all be considered as belonging to the single species *Salmo trutta*, which also abounds in the continental rivers. The same applies to the salmon, *Salmo salar*. The extreme plasticity of these animals, especially the trout, in virtue of which they react by alterations of structure and colour to varying environment, has given rise to a conviction among anglers, very difficult to shake, that there are numerous good species. Other freshwater fish, such as the grayling, carp, tench, roach, bream, and pike, do not call for especial comment, as they are all widely distributed on the Continent, but there are several species of the Salmonid Genera, *Salvelinus* and *Coregonus*, which are peculiar to the British Isles.

There are fifteen species of *Salvelinus* or char peculiar to the lakes of Scotland, Ireland, and the Lake District of England. They differ from trout in their smaller scales, the absence of black or brown spots, and the redness of the belly (char = Celtic *cear*, blood or red). The existence of these species is probably due to their having descended from one or more ancestral species which were in the habit of migrating from the sea into the lakes to breed, much as trout and salmon do now, and to their having been cut off and isolated in the lakes they now occupy when the sea receded and there was no longer access to and from the lakes.

The same explanation applies to the vendaces and pollan belonging to the genus *Coregonus*. These fish are very like herrings in appearance, save that they possess the characteristic salmonid dorsal adipose fin. The vendace is found in Lochmaben, Dumfriesshire, and in the English lakes Derwentwater and Bassenthwaite. The pollan occurs in Loughs Neagh and Erne, Lomond and Eek, and in the Shannon; the schelly in Haweswater,

Ullswater, and Red Tarn, and the gwyniad in Bala Lake. The method of derivation of these fish from a migratory ancestor in the habit of ascending a river, passing up what is now the Irish Sea, is shown in the map constructed by Dr. R. F. Scharff.

Invertebrates.

Space will not permit us to examine the invertebrate fauna with the same detail as the vertebrate. Among insects there are a large number of species, or at any rate of well-marked varieties, recorded from the British Isles which have not been met with elsewhere, either on the Continent or further afield. The only peculiar butterfly of specific rank is the large copper (*Chrysophanas dispar*), which was once locally abundant in the fens of Cambridge-shire and Huntingdonshire but is now extinct. A useful list of some of the insects and mollusca supposed to be confined to the British Isles is given by Wallace in his *Island Life*. All these species have close relations on the Continent, and it may be doubted whether the future may not show that in a great many cases they do occur in other countries but have been overlooked.

Some of the invertebrates are of interest in indicating the derivation of our fauna from various elements abroad, and they will be mentioned in discussing this problem to which we now turn.

Four elements of British fauna.

Dr. R. F. Scharff, in his book on European animals, distinguishes four distinct elements in the British fauna and flora, which he holds to represent four distinct sources of immigration in past times. They are in order of antiquity North American, Lusitanian, Scandinavian, and Germanic. He believes that the first two entered in pre-glacial times, and that the last two were probably inter-glacial and to some extent post-glacial. His view presupposes that the glacial period was by no means the exterminating agent which many naturalists have claimed it to be, and that a great part of the pre-glacial inhabitants of these islands survived to leave descendants down to the present time.

The species indicating affinities with North America are three freshwater sponges from lakes on the west coast of Ireland, the freshwater pearl mussel (*Margaritana*

margaritifera), the great auk, which lived in Scotland and Ireland less than a hundred years ago, and was also distributed to Iceland, Greenland, and the coast of Newfoundland.

The Lusitanian element consists of a few existing plants and animals, now mostly confined to the west coast of Ireland and in some cases to Cornwall and Devon, which have their nearest relatives in Southern Europe, and are supposed to have reached the British Isles from the north-west coasts of France at a remote period. Examples of these species are, among plants, the Arbutus or strawberry tree, now confined to the south-western corner of Ireland and the Mediterranean region; the London pride (*Saxifraga umbrosa*), confined to Ireland and Spain; the Mediterranean heaths in Ireland, and the Cornish heath. Among animals we have the peculiar spotted slug (*Geomalacus maculosa*), which occurs only in the south-west of Ireland and the north-west corner of Spain; the claret-coloured wood-louse (*Trichoniscus viridus*), from County Waterford and France south of the Pyrenees; and the slug (*Testacella mungei*), inhabiting the south of Ireland, south-west England, and the south-west of Europe. The extraordinary discontinuous distribution of these forms is to be noted, as it indicates their extreme antiquity in their present habitats.

It seems reasonable to suppose that the southern types of mammals which flourished in England in the Pleistocene Period, such as the lion, tiger, hyaena, and hippopotamus, belonged to the same immigration which left these Lusitanian forms on our shores.

The North European or Scandinavian immigration appears to have taken place when Ireland was still connected with the sister isle, such a northern animal as the mountain or Arctic hare being common to Ireland and Scotland. In prehistoric times we have also abundant evidence that such northern forms as the reindeer, the Arctic fox, and Arctic lemming, inhabited Ireland, as their remains have been found in numerous Irish caves.

The next great invasion from the Continent, the

Germanic, apparently took place after Ireland had been separated from Great Britain, as the essentially Germanic element which constitutes so large a part of the English and Scottish fauna is in certain cases conspicuously absent from Ireland. In this way it is possible to account for the absence in Ireland of some of the commonest species of English and Scottish mammals, such as the mole and dormouse, &c. The distribution of the mole on the Continent is of some interest, stretching as it does right across the Central European plain through China to the sea, but nowhere extending very far north or south. It suggests a continuous migration from the east to west, stopping short only at the Irish Sea, and this east to west migration is suggested by the distribution of other animals of the Germanic type, e.g. the hamster, which never reached the shores of Britain. A final example of a Germanic species with a peculiar distribution in England is the so-called Roman snail, *Helix pomatia*. This handsome large snail is distributed through France and Germany, but barely reaches into Italy; in England it is confined to the south-eastern and south-midland counties. It was always supposed to have been introduced by the Romans, but it has now been found in deposits of pre-Roman origin, so that its confined distribution in England is probably due to comparatively late arrival by natural means across the Channel land passage.

Although much of the above argument must remain highly speculative, especially as to the periods during which the immigrations took place, and their relation to the climate prevailing at the time, it is undoubtedly true that these various elements can be distinguished in our fauna, and it is useful so to distinguish them, though their place and time of origin and the causes which led to their wanderings, extinction, or survival, must remain extremely dubious.

Marine mammals

In conclusion, mention may be made of the seals and whales which are found on the British coasts (see Lydekker, *British Mammals*). The grey seal (*Halichoerus grypus*) is restricted to the shores of the North Atlantic Ocean,

especially the North British and Scandinavian coasts. It is only a rare straggler on the southern coasts of England, its chief haunts being in the Hebrides and the west coasts of Ireland. The breeding season is in late autumn. The only other seal which breeds on our coasts is the common seal (*Phoca vitulina*). This gregarious seal has a wider distribution than the grey seal, both north and south, occurring in the Pacific as well as the Atlantic, and it ranges on to the coasts of France, and on to the Welsh coasts with fair frequency. The ringed seal (*Phoca hispida*), hooded seal (*Cystophora cristata*), and the walrus (*Trichechus rosmarus*) are only very rare stragglers in British seas. Of the cetaceans, a large number are exceedingly rare visitants, e.g. the southern right whale (*Balaena australis*) and the sperm whale or cachalot (*Physeter macrocephalus*). Of more frequent occurrence are the common porqual (*Balaenoptera musculus*), generally thrown up on the southern coasts, the lesser porqual (*B. rostrata*), and the common bottle-nosed whale (*Hyperoodon rostrata*), which is frequent off the Shetlands. Of porpoises and dolphins, the common porpoise (*Phocaena communis*) is the most abundant of all our cetaceans, while the grampus (*Orca gladiator*) is a not infrequent visitor. The pilot-whale (*Globicephalus melas*) is fairly frequent in the north; the common dolphin often visits our southern coasts, but is rarely seen in Scotland.

General books : A. R. Wallace, *Island Life*, 1902 ; R. F. Scharff, *European Selected Animals*, 1907. Mammals : R. Lydekker, *British Mammals* in Allen's *Naturalists' Library*, 1895 ; J. E. Harting, *Extinct British Mammals*, 1880 ; Bell's *British Quadrupeds*. Birds : Garrell's and Seebohm's large treatises ; a smaller manual by Howard Saunders. Lizards and Serpents, by G. R. Leighton. Freshwater Fishes, by Tate Regan. Insects : *British Lepidoptera*, by J. W. Tutt ; *Coleoptera*, Fowler ; *Hymenoptera aculeata*, Howard Saunders ; *British Ichneumons*, Morley ; *British Dragon-flies*, W. J. Lucas. Mollusca : *Land and Freshwater Shells*, by Rainer.

CHAPTER V .

THE BRITISH SEAS AND SEA-FISHERIES

BY JAMES JOHNSTONE

IN dealing with the British sea-fisheries, it will be convenient to consider first the topography of the sea and sea-bottom round the British Isles ; then the physical conditions and periodic variations of the water of these seas, so far as the fishery investigations of the last decade have made these known, and finally the nature and productivity of the fisheries carried on in the seas frequented by British fishing vessels.

Topo-
graphy
of the
British
seas.

The British Isles are situated on an extension seawards of the continental land-mass, a comparatively narrow selvage of shallow sea-bottom fringing all the great continents and extending seaward for a variable distance. On this 'Continental Shelf' itself the gradients of increasing depth are in general very slight, until a depth of about 200 metres (or 100 fathoms¹) is reached, and then the sea-bottom slopes relatively rapidly down into the oceanic abysses. The North Sea, the Irish Sea and St. George's Channel, the Bristol Channel, and the English Channel are all situated upon the British submarine plateau, or North European continental shelf, and there are only a very few places where the depth of the sea is much greater than 100 metres (or 50 fathoms). There is a relatively narrow depression of the Irish Sea and St. George's Channel, between the Isle of Man and the east coast of Ireland, and this continues to the south along the Irish coast, and to the north as a very narrow channel along the Galloway coast of Scotland, where it attains a maximum depth of 272 metres (149 fathoms) ; it is the

¹ The corresponding round numbers are used for fathoms where average or relative values are given ; but the exact equivalent in fathoms is given where the depths are definite.

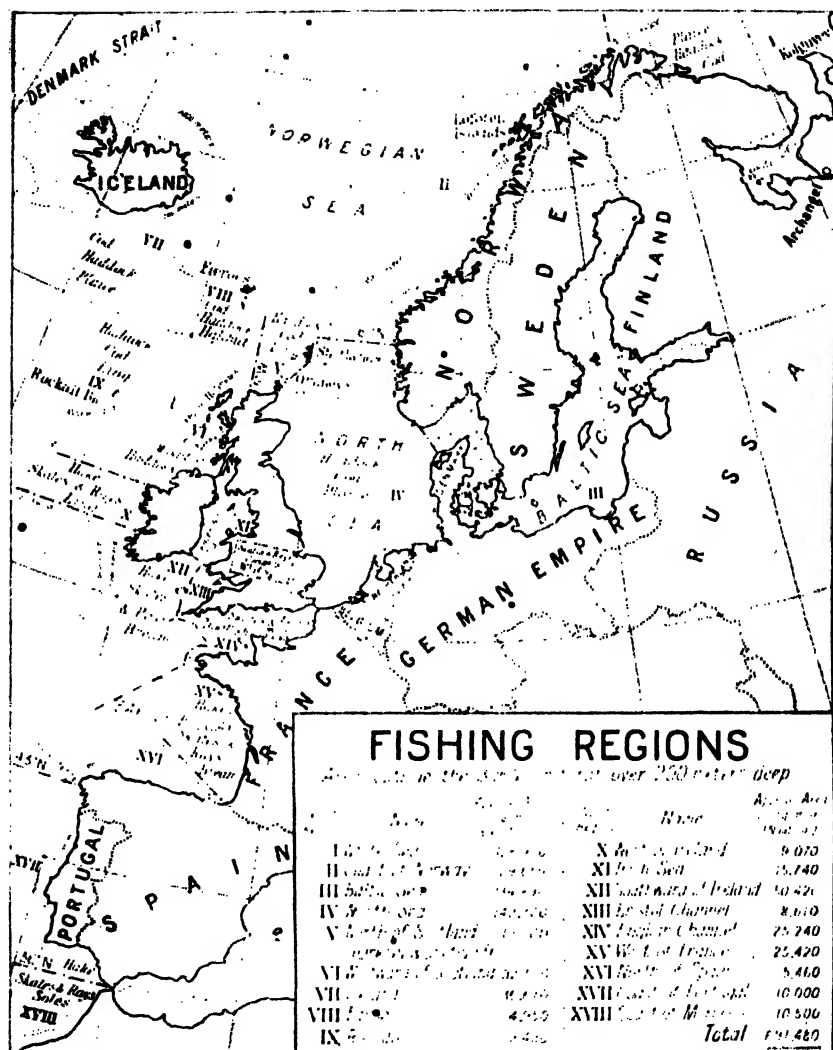


Fig. 40.

remains of an ancient river valley. Depths of over 200 metres have also been observed in some of the sea-lochs on the west coast of Scotland. The whole North Sea is relatively shallow, particularly in the southern parts. As far north as about $57^{\circ}5'$ N. lat. the depth is hardly anywhere greater than 100 metres, but north of this parallel the bottom slopes downwards into the depths of the Norwegian Sea. A fairly wide depression of the sea-bottom, where the depth may be over 600 metres (or 300 fathoms), follows the coasts of Norway and Sweden and extends into the Skagerrak. Apart from this, the North Sea is shallower, on the whole, than the Irish Sea and St. George's Channel. The Bristol and English Channels are also shallow water areas, and the depths are almost everywhere less than 100 metres.

Submarine
limit of
the
British
plateau.

The 200-metre contour line, which may be taken as representing an arbitrary seaward limit of the British plateau, approaches nearest to our islands in the latitude of Achill Head, on the west coast of Ireland, where it is only about 40 miles distant from the land. It is about 140 miles distant from Land's End at its nearest point, and about 70 miles distant from Brest. From this point it approaches the continental coast, becoming nearest at the Spanish-Portuguese frontier, where that impinges on the sea. Along the coasts of Spain and Portugal it is at an average distance from the land of little over 30 miles.

There are two elevations of the sea-bottom off the west coasts of the British Isles, well outside the 200-metre contour line. One of these is about 120 miles from the coast of Galway, and the other surrounds Rockall. Both are very important fishing grounds. North from the Shetland Islands the British plateau is continued to the north-west as a ridge of sea-bottom joining Shetland and the Faeroe Islands: this is the Wyville-Thompson Ridge, and over its most elevated part the sea has an average depth of about 400 metres (200 fathoms). There are extensive banks round the Faeroes, and these are again continued further to the north-west until they join the banks surrounding Iceland: over the Faeroe-Icelandic

ridge the sea has an average depth of about 600 metres (300 fathoms). Thus an extensive elevation of the sea-bottom joins Britain with the Faeroes, Iceland, and Greenland. It separates the North Atlantic Ocean into two very distinct and different basins: the Norwegian basin to the north-east of the ridge, and the Atlantic basin to the south-west. The sea-bottom slopes down slowly from the Wyville-Thompson Ridge to a depth of over 3,500 metres (1,900 fathoms) in the Norwegian Sea, and more rapidly to still greater depths in the Atlantic basin. This ridge, or 'barrier', is a factor of great importance in the circulation of the water of the northern Atlantic and Norwegian seas.

The sea-bottom itself over all this area of shallow water is relatively uniform. Within the 200-metre line the bottom deposits are everywhere 'terrigenous' in nature, that is, formed from the erosion of the adjacent land. They therefore reflect the geological nature of the latter, and are composed of more or less coarse gravels near the land, and then of fine clean sand. In channels and depressions where there is not much run of water, as underneath tidal eddies, fine mud may be laid down. On the other hand, the sea-bottom in places where the stream or current is rapid may be of almost bare rock. This is the case in the Irish Sea on most parts of a line joining Calf of Man with Holyhead, where the sea is deepest; and also on the Wyville-Thompson Ridge, where the current scours any light deposits from the sea-bottom. In the narrower channels near the land the powerful tidal streams merely shift the sand from place to place, and a wreck or other heavy mass on the sea-bottom may become sunk in sand within a few days. In some parts of the North and Irish seas there are also glacial deposits, for some ridges of stones in the North Sea appear to be the remains of ancient moraines. Round the coasts of Iceland the bottom deposits may be markedly magnetic and render the navigation of fishing vessels in these regions dangerous and even disastrous. Outside the 500-metre (275-fathom) contour line the terrigenous sands become

replaced by fine muds, and further out still this terrigenous mud disappears and is replaced by the globigerina ooze which is the characteristic Atlantic abyssal deposit. In the shallow waters, particularly near the land, the terrigenous gravels, sands, and muds may be mixed with materials of organic origin, mainly the broken shells of mollusca, or the calcareous skeletons of certain algae or polyzoa. To some extent this calcareous (or siliceous in the case of sponge remains) organic debris is found in all shallow-water deposits.

Fisheries :
home,
northern
and
southern
regions.

The North Sea, the Irish Sea, with St. George's Channel, the Bristol and English Channels, the shallow seas round the north, west, and south of Ireland, and the banks off the coast of Galway, together form what may be called the Home Fishery Regions. Their combined area is over 300,000 square nautical miles (400,000 square statute miles). Over the greater part of this extensive tract of sea fishing of some kind or other is carried on. Trawling is possible, as a rule, only on a sea-bottom composed of gravel, sand, or mud. If there are large stones the trawl-net becomes arrested, but various contrivances are now used which allow of trawling being carried on on much rougher sea-bottoms than was formerly possible. Fishing by means of long lines carrying baited hooks, or by drift or trammel nets floating freely in the sea, may, of course, be conducted over any kind of sea-bottom. The North Sea, the Irish Sea, and the two Channels are the traditional British fishing grounds, and trawling was formerly restricted to these seas. With the advent of steam fishing vessels, the area exploited became enormously enlarged.

The Northern Fishery Regions possess many common characters. They are the Barents Sea, that is the Arctic Sea off the mouth of the White Sea proper and extending north as far as the ice-fields; the Icelandic Banks; the Faeroese Banks; the Rockall Bank, and the sea to the immediate north and west of Scotland as far from the land as the 200-metre contour line. British steam-vessels frequent all these regions. There is some trawling off the west

coast of Norway, and even in the Baltic, but the quantity of fish landed from these sea-areas is so small that it has not hitherto been included in the statistical accounts.

The Southern Fishery Regions include the coastal waters off the mouths of the Irish Sea and the English Channel; that off the coasts of France, Spain, and Portugal, extending into the Bay of Biscay; and the coastal waters off Morocco, as far south as about 30° N. lat. The whole area formed by measuring these northern and southern regions out to the 200-fathom contour line, and adding that of the Home Regions, is well over 700,000 square nautical miles (1,000,000 square statute miles). We may speak of it all as the British fishery area, since the greater part of the fish caught in it by trawling is taken by British vessels.

The tides and tidal streams are of local rather than general importance to the fisheries. The main scheme of the British tides is as follows:

Water
circulation in the
British
area:
Tides.

The Atlantic tidal undulation approaches the Irish coast with a rather oblique front and splits into three waves. One of these enters the English Channel, and being partially reflected from the narrows at Dover, produces very complex effects: part of it, however, penetrates into the North Sea. The second wave enters the Bristol Channel, and as the latter narrows, acquires a great amplitude, along with a translatory motion, producing the tidal 'bore' of the Severn. The third wave enters St. George's Channel, and also acquires a translatory motion. It is deflected by the rotation of the Earth, to the east, so that the stream enters the Irish Sea and flows mainly between England and the Isle of Man. The primary tidal wave also sends a stream into the northern part of the Irish Sea, through the North Channel, and these two streams, north and south, meet and interfere along a line drawn from about Ramsey, in the Isle of Man, towards the mouth of Morecambe Bay in Lancashire. The remainder of the Atlantic undulation then passes to the north-east, entering the North Sea round the coasts of Scotland, and then impinging on the coasts of Norway.

Currents. Four main streams, or currents, take part in the circulation of water in the British fishery area: (1) the Gulf Stream or North Atlantic Drift, or European Stream; (2) the Polar current; (3) the Baltic current; (4) the Mediterranean current.

Gulf Stream or North Atlantic Drift. The Gulf Stream properly so-called is the current of relatively warm and dense water formed by the juncture of the North and South Equatorial streams. Part of it flows out from the Gulf of Mexico through the Strait of Florida, but probably the greater part passes to the outside of the West Indian islands, and the combined stream then flows to the north-east along the coast of North America. It is continually deflected to the right (the deflecting force due to the rotation of the Earth being proportional to a function of the sine of the latitude). It thus spreads out fan-like into the North Atlantic, forming a gigantic eddy or anti-cyclonic circulation, returning again to rejoin the North Equatorial stream. In the centre of this eddy is the Sargasso Sea, an extensive tract of water containing much 'Gulf-weed' (*Sargassum*). The limits of this eddy are variable with the season; in March it extends no further north than the latitude of the Azores, but in November it spreads much further to the north-east and may approach closely to the coasts of northern Africa and southern Europe. The drift of water reaching the British Isles and the coasts of northern Europe originates in this Gulf Stream eddy. Both the temperature and the salinity¹ are relatively high.

Polar current. The Polar current originates in high northern latitudes, being caused partly by the entrance of fresh water into the sea, partly by the melting of ice, but mainly by rather complex thermodynamical factors. It flows mainly to the east of Greenland and Iceland, then becomes deflected to the right round the south of Greenland into Davis Strait, where it joins a southerly drift of water coming

¹ 'Salinity' is the total mass of salts, measured in grammes, contained in 1,000 grammes of sea water, provided that all carbonates are reduced to oxides, that all halogens are estimated as chlorine, and that all organic matter is ignited. Salinity is always determined by estimation of the chlorine.

down from the north. It then flows to the south-west towards the coast of Labrador, as the current so named, and at about 41° N. lat. it impinges on the northerly-flowing Gulf Stream, the waters of the two currents interpenetrating each other as distinct strata. The Polar currents consist of relatively cold water of low salinity.

The Baltic current flows out through the Sound, Cattegat, and Skagerrak, and then streams mainly to the north along the coast of Norway, but also, to some extent, to the south along the coast of Jutland. It is a current produced by dilution, that is, the amount of fresh water entering the Baltic Sea by precipitation, and from the great rivers, is more than is removed by evaporation. A current of water, therefore, streams out from the Cattegat along the surface, while a compensatory current flows in along the sea-bottom. The outflowing Baltic current consists of relatively cold water of low salinity.

The Mediterranean current is a concentration stream. The amount of water entering that sea from rainfall and from the land is much less than the amount removed by evaporation. The level of the Mediterranean tends, therefore, to become lowered, and a superficial current of Atlantic water flows into it through the Strait of Gibraltar, while a compensatory current flows out at a deeper level. It is this deep current with which we are concerned. It consists of relatively warm water of high salinity.

All these various streams reach the British seas and produce very important effects. The drift resulting from the momentum of the Gulf Stream eddy, and helped, no doubt, by the impelling force of the prevalent south-westerly cyclonic storms, impinges on the west of Ireland and Scotland, and some of this Atlantic water enters the English Channel and even penetrates into the southern part of the North Sea. Another off-shoot from the Gulf Stream Drift enters St. George's Channel, and can be recognized as far north as the sea between the Isle of Man and Anglesey. The remainder passes on to the north, and a considerable volume of water enters the North Sea after flowing to the north of the Shetlands. This

inflowing Atlantic water forms a cyclonic circulation of great dimensions in the North Sea, the water flowing over towards the continental coasts, then south along the latter, and back again towards the east coast of Scotland. The main drift of Atlantic water impinges on the submarine barrier formed by the elevations of the sea-bottom between Shetland and Greenland, and some of it bathes the coasts of Iceland, and even penetrates as far to the north-east as the coasts of Spitsbergen. A relatively strong flow of water, however, passes over the Wyville-Thompson Ridge, and then, flowing through the Shetland-Faeroe Channel, impinges on the western coast of Norway. This is the main axis of the Gulf Stream Drift in high latitudes. The water flows round North Cape into the Barents Sea, but by this time it has parted with a considerable proportion of its heat, and sinks below the surface, flowing on as a bottom current.

Waters of
Polar
origin.

Unmixed water of Polar origin probably never enters the British seas, but the Gulf Stream water that does bathe our coasts may at times become mixed with cold and light water from the north. It is probable that some of the water of the Labrador current becomes transported towards the British Islands by mixture with the Gulf Stream Drift, and this is the more likely to happen in those years when the Labrador current is relatively strong and the Gulf Stream Drift relatively weak. Also some southerly-flowing Arctic water is carried across to the east in the Norwegian Sea, where there is a very complex system of cyclonic eddies of various dimensions; and this water may be taken into the off-shoot of the Gulf Stream Drift which penetrates into the North Sea. The western shores of the British Islands can hardly be affected by the Polar currents except by the mixture of Labrador current water with that of the Gulf Stream Drift.

Mediterranean
and
Baltic.

Not very much is known with regard to the distribution of Mediterranean water in the British seas. The temperature in the Mediterranean, down to great depths, is relatively high—about 12°–13° C. (= 53°–56° F.), and the water is also highly saline. Because of its high salinity

it is very dense, so that it flows as a deep current. It is continually deflected to the east by reason of the rotation of the earth, so that it approaches the west coasts of Britain. It can be recognized as a deep, warm, and highly saline stratum in the channel between Scotland and the Rockall Bank, and it may also become mixed with the water normally present in the sea near the land, and so may raise the salinity of the inshore shallow water seas.

The outflowing Baltic current has not been very extensively investigated, but its effects are probably of local importance only.

Both the temperature and the salinity of the water of the British seas are subject to variation. In the open Atlantic to the south and west of Ireland the temperature of the sea varies between 10° C. and about 15° C. (50°-59° F.); in the Faeroe-Shetland Channel the range is between about 7° C. (= 44.5° F.) and 12° C. (= 54° F.). In the Barents Sea it is from 0° C. to 10° C. (= 32°-50° F.). As we approach the land the temperature variations throughout the year become of greater magnitude. In St. George's Channel as far north as the sea between Holyhead and Isle of Man the temperature varies between about 6°-7° C. (43°-44.5° F.) to about 10°-12° C. (50°-53.5° F.). In the Irish Sea near the land the variation is from about 3° C. (37.5° F.) to about 18° C. (64.5° F.). Similar temperature ranges are observed in the North Sea, the amplitude of the annual wave being least in the central parts and greatest in the shallow inshore parts. Sea-water itself has a high specific heat, so that its temperature rises to a much less extent than that of the land, when both surfaces are exposed to the same intensity of solar radiation. The land therefore heats up to a much greater extent than the sea during the summer, and cools down much lower during the winter. In the summer the shallow inshore waters absorb this accumulated heat from the land and become hotter than they would by reason of solar radiation alone. Conversely, the shallow inshore waters become cooled by contact with the land

Annual periodic changes in physical conditions.

during the winter months. If tidal streams were absent, or were much weaker than they are, this heating and cooling effect of the land would be of very little importance. But round most of the shores of the British Islands the tidal streams are relatively strong, and the influence of the land becomes apparent at considerable distances, for the tides transport water to and from the land for many miles.

Position
of iso-
therms
and flow
of warm
Atlantic
water.

The isotherms are neither parallel to the latitudes, as they would be if the height of the sun alone counted, nor parallel to the coast, as they would be if the effect of land and water alone counted. In the open North Atlantic the isothermal lines are bent toward the north-east. This is also the case in the Irish Sea. In the North Sea the isotherms are curved towards the east into the Skagerrak, and in the south towards the central part of the basin: They are also bent towards the north-east towards the west coast of Norway. This indicates that there is a flow of warm water from the open Atlantic south from the British Isles towards North-West Europe, which affects the course of the isothermal lines. That warm and dense water is transported can be proved in various ways: (1) by actual observation of the drift of floating objects, either wreckage, or surface or bottom 'drift-bottles', or other articles set free from determined positions; (2) by actual measurements of the velocity of the currents, after allowing for the effects of the tides; and (3) by calculations from Knudsen's 'Hydrographic Theorem', a relation between salinity, precipitation, land drainage, and flow of water. The result of all these methods is to show that water flows through the Straits of Dover into the North Sea at the rate of about 3 miles per 24 hours; through the North Channel, out from the Irish Sea, at the rate of 4 miles per 24 hours; and over the Wyville-Thompson Ridge, in the Faeroe Channel, into the Norwegian Sea, at 6.2 miles in the same period. The flow is thus relatively rapid in confined seas, or in straits, but in large, open sea areas, as in the Atlantic or the Norwegian Sea, it is very much less. Thus a water-

particle will take, on the average, about two years to travel from the Wyville-Thompson Ridge to the Barents Sea, or the sea west of Spitsbergen.

This inflow varies both periodically and irregularly. Periodic annual variations in the strength of the Gulf Stream Drift are due to the shifting north and south of the positions of the equatorial streams as the sun passes from north to south (and vice versa) of the equator in the course of the year. The result of this periodic change of the North Equatorial Stream is the expansion (culminating in November) of the Gulf Stream eddy, and its contraction (reaching a minimum in March) back to its former position. As the area of the Atlantic covered by Gulf Stream water expands, the flow of this water towards the north increases, and this maximal inflow is attained at different times in different latitudes. In the North Sea and English Channel the greatest inflow of Atlantic water occurs in spring; in the Irish Sea it is a little later—about May; it is later still in the remote northern seas, occurring about November in the deep waters of the Barents Sea. The inflow of Atlantic water into the enclosed and coastal seas of Northern Europe is accompanied by an increase of temperature and salinity, since the inflowing water has a higher temperature and salinity than that which would be normally present in these areas if there were no currents.

All the other currents vary in strength in an analogous manner, but the factors determining these variations have been much less completely investigated than in the case of the Gulf Stream Drift.

In addition to these annual periodic variations of temperature and salinity there are also variations of longer period, or perhaps unperiodic in character. There is apparently a temperature and salinity period of either two or three years; and one of ten to twelve years, this last period being almost certainly associated in some way with the eleven-yearly sun-spot period. These longer periodic changes are of great interest and practical importance, since not only the general character of the weather, but

Varia-
tions in
Gulf
Stream
Drift.

Secular
and
irregular
changes.

also variations in the productivity of the fisheries appear to depend on them. The general nature of the weather over the British Islands depends largely on the origin, path, and intensity of the cyclonic atmospheric disturbances reaching our shores either from the Atlantic to the south-west, or from the Icelandic seas. These are regions of atmospheric instability, the former being situated near the margin of a belt of high pressure, and the latter being a centre of low pressure. In each case the temperature distribution on the surface of the sea is also unstable, and this instability depends on, or is rather the result of, the changing velocity and direction of the currents. A very large isolated patch of water which is warmer than the adjacent water will set up an ascending current of air, and consequently a cyclonic disturbance, which will then travel in a direction determined by the general atmospheric circulation. Relative stability in the distribution of temperature in the Atlantic to the south-west of the British Islands, or in the sea round Iceland, will therefore be accompanied with calms—usually weather of the anticyclonic type; while instability will commonly be associated with the generation of cyclonic disturbances, and consequent rainy and stormy weather. Since changes in the distribution of water of unequal temperature occur with relative slowness, it is possible to forecast the general conditions of the atmosphere to which they give rise.

Salinity
changes.

Salinity changes are generally, but not always, concomitant with changes of temperature. Gulf Stream water is relatively warm, and its salinity is high (in the margins of the Sargasso Sea about 36 to 37 ‰). In the open sea off the west coast of Ireland the salinity varies between 36 and 35 ‰; in the Faeroe Channel and the eastern parts of the Norwegian Sea, it is about 35·5 to 35 ‰; in the North Sea there is not much water of salinity of over 35 ‰, and this is the case also in St. George's and the English Channel. The Irish Sea and the inshore waters to the west of Scotland are seas of low salinity, the values varying between 34·5 and about 30 ‰. The Baltic is a sea of low salinity, and in some places the water

may actually be fresh. The Polar streams are relatively cold, and their salinity is low—about 30 to 32 ‰. Changes in the salinity of the sea-water in the British seas occur more slowly than do changes in temperature, since they can only be effected by the mixture of the inflowing Atlantic water with water from the Polar and Baltic currents, or from that draining off the land.

The temperature and salinity changes so far mentioned are those of the superficial waters. In the shallow, enclosed, and coastal seas the water is generally homothermic and homosaline—that is, there is hardly any difference, as a rule, between the temperature and salinity of the water from the surface down to the bottom. This is because of the very thorough mixture of water produced by the rapid tidal streams and storms in these regions. In the deeper oceanic basins, however, the difference may be considerable: thus the temperature of the Atlantic at depths of about 3,000 metres to the south of the Wyville-Thompson Ridge is about 2.5° C. (36.5° F.) on the average, while it varies between about 5° to 8° C. (41° to 44.5° F.) on the surface. On the north-east side of the Ridge the surface temperature of the Norwegian Sea is very much as it is in the Atlantic, but the bottom temperature varies between - 0.5° C. and - 0.8° C. (31.1 and 30.6° F.). The bottom temperature in the Skagerrak and Barents Sea may actually be much higher than at the surface. The low temperature of the bottom water in the Atlantic and Norwegian basins is due to the sinking by convection of water which has become dense because of cooling by radiation. The high temperature of the bottom water of the Skagerrak and Barents Sea is the result of the sinking towards the bottom of Atlantic water, which, although it is relatively warm, is yet very dense by reason of its high salinity.

Because of these differences in physical conditions there are notable differences in the kinds of fish taken in the various fishery regions. It is, of course, impossible to give a complete account of the distribution of edible sea-fishes in the north European seas. The most abundant

Changes
with
depth.

Fisheries:
distribu-
tion of
fishes.

species belong to about half a dozen families ; they are : *Clupeidae*, the herring, sprat, and pilchard ; the *Gadidae*, cod, haddock, whiting, hake, coalfish (or saithe), ling, and pollack ; the *Pleuronectidae*, plaice, sole, brill, turbot, halibut, lemon sole, witch, megrim, dab, and flounder ; *Rajidae*, various species of skates and rays ; *Scylliidae*, two or three species of dogfishes ; various other families, including the species mackerel, gurnard (several species), bream, angler-fish, catfish, and dory. These are the principal species brought into the markets. Most of them may be found in one or more of the fishery regions—the North Sea, for instance—but their relative abundance varies with the fishing ground. The following account is based upon the statistical returns for 1910. It includes only trawl-caught (bottom-living or demersal) fishes.

The home
regions.

The North Sea. The principal species of fish landed from this region are haddock (42 % of the total weight of all fish landed), cod (20 %), plaice (14 %). Whiting are also fairly abundant. Turbot, brill, and soles are also taken in paying quantities, but soles are restricted to the part of the North Sea lying south of a curved line drawn from Denmark, south of the Dogger Bank, and then across towards the Scottish coast.

The Irish Sea and St. George's Channel. Skates and rays form 20 % of the total catch, plaice 18 %, and cod 17 %. Turbot and brill are also taken, but not in abundance—the former species is the rarer. Soles are relatively abundant in some parts of the region, more so perhaps than in any other of the home regions. Gurnards are abundant. In the inshore waters flounders and dabs are abundant, but these fishes have little commercial value. Cod and whiting occur mainly in the winter and spring. Haddock are arbitrary in their appearance, occurring in abundance in some years, and being almost absent in others.

The Bristol Channel. Skates and rays form 25 %, conger-eels 11 %, and whiting 10 % of the total catch. In other respects this area resembles St. George's Channel.

The English Channel. Plaice are abundant, forming

13% of the total catch; skates and rays form 18% and dogfishes 11% of all fish taken.

The West of Scotland. Northern species are abundant. Cod and coalfish each form 18% of all fish landed, and haddock 17%. Other species, such as ling and halibut, occur. Some southern forms—hake, bream, and megrims—are taken. Skates and rays are common.

The West of Ireland. The fish found is partly southern and partly northern. Hake (a southern species) form 36%, ling (a northern species) 17%, and skates and rays 13% of the whole catch taken.

The South of Ireland. The typical fish taken here in deep water is the hake, which forms 64% of the total catch. Bream (a southern species) form 6% and skates and rays also 6% of all. The southern regions

The Bay of Biscay. These grounds are visited chiefly for the hake which they contain. Bream form 3%, and skates and rays 9% of the total quantity of fish taken. Trawling is carried on here in deeper water than in any of the other regions, the vessels 'shooting' their nets sometimes in 450 metres (260 fathoms), and dragging in towards shallower water. The trawlable area is restricted, forming a rather narrow margin chiefly on the Spanish side of the Bay.

The Coasts of Portugal and Morocco. Hake (65%) is again the predominant fish taken. Skates and rays form 16% of all. Soles are relatively more abundant in this region than elsewhere, and form 12% of the total catch.

The North of Scotland. Gadoid fishes are the most abundant of all in this region. Haddock form 28%, cod 27%, and ling 12% of the total catch. Halibut also occur, with the ubiquitous skates and rays. The northern regions

The Rockall Banks. The fishery in this region is very similar to that in the sea to the north of Scotland. Haddock form 25%, cod 18%, and ling 17% of the total.

The Faeroe Banks. Cod form 49%, haddock 26%, and halibut 6% of the total. The region is very important, because of the value of the halibut taken.

The Iceland Banks. Fishing is restricted to a com-

paratively narrow belt of sea round the island, and is carried on principally during the summer months. The principal species taken are cod (47 %), haddock (23 %), and plaice (9 %). Ling, coalfish, and halibut are also taken. When this region was first exploited by English steam trawlers, during the first few years of the twentieth century, very large quantities of large plaice were caught, but the proportion of this fish taken has steadily decreased since then.

The Barents Sea. This region is better known to trawlers as the 'White Sea'. It has only recently been extensively fished, and the fishery (depending upon the inflow of Gulf Stream water) is only practicable during a few months in the year. So far it has been a very lucrative plaice ground, the proportion of this fish taken being 84 %. Haddock come next (10 %), and then cod (5 %). The proportion of plaice taken, as in the case of the Icelandic fishery, will probably decrease as the grounds are increasingly exploited.

The
pelagic
fisheries.

Fisheries for surface-living fishes—the herring, sprat, pilchard, and mackerel—constitute the pelagic fisheries. The most important species is the herring, which is the most abundant of all species, demersal or pelagic, taken by British fishermen. The herring is essentially an open sea or even oceanic fish, shoaling at certain seasons as it approaches the land. Its northern limit of distribution is about the latitude of the southern point of Greenland, while the Bay of Biscay forms its southern limit. It occurs all round the coasts of Britain, but is most abundant on the north-west and north of Scotland, and on the western side of the North Sea, almost as far south as the Thames estuary. Generally speaking, the fishery is later in the year the further south the shoals appear. Large quantities of herrings are also caught by trawling.

The sprat is most abundant in the Thames estuary and on the south-east coast of England, in the Firth of Forth and in the inshore waters of the Moray Firth. It is abundant on the west coast of England northward from

Wales. It occurs elsewhere, of course, but the only important fisheries carried on are those on the south-east of England and in the firths on the east of Scotland. It also is a northern fish, typically, and occurs in great abundance in the Norwegian fiords; but it also is found in the Bay of Biscay and in the Mediterranean. The fish from these various regions form, however, local races, or varieties. The pilchard occurs in abundance only in the English Channel, off the coasts of Cornwall and Devon. It is a southern fish. The mackerel is also a southern fish which occurs in abundance in the English Channel, in St. George's Channel, and the Irish Sea, and in the sea off the west of Ireland. It appears to approach the British Islands from the south when the Gulf Stream flow becomes strongest.

The British fishery area therefore contains fish belonging to two main categories, northern and southern species. There is no hard and fast line between these categories; the distinction is based rather on the commercial abundance of the fishes. Cod, halibut, ling, haddock, and herring are northern species; hake, mackerel, megrims, and pilchards are southern forms. The plaice is, on the whole, a northern species, as its distribution in the Barents Sea and round the coasts of Iceland shows. It is almost equally abundant everywhere in the more shallow parts of the home seas. It is of little commercial importance south from the English Channel. The sole is, on the whole, a southern fish, but it occurs all over the Irish Sea, and even in the Firth of Clyde. This latter area represents its northern limit of distribution on the western side of Britain, just as the Dogger Bank marks its northern limit on the eastern side. Other species, such as skates, rays, gurnards, &c., are very widely distributed, and little can be said of a general nature as to their occurrence. The sprat is also an example of a very widely distributed fish, the precise variety of which depends, however, upon the region in which it occurs. It is abundant, for instance, not only in the British Seas, but also in the Mediterranean and off the

Classification of
northern
and
southern
species.

coasts of Norway. But in these different regions it exists as distinct varieties.

Many of the species of commercial fishes are migratory, and their abundance in any one region varies from season to season. The mackerel is such a fish, migrating northwards from the south, and the cod is one which migrates southwards from the north. These migration paths, with their limits and periods, are fairly well marked, and are the same (with aperiodic fluctuations) from year to year. Many other species carry out migratory movements on a more limited scale. In all cases the factors determining the migrations in general, as well as the aperiodic variations with respect to extent, limits, and times, are the periodic and aperiodic variations in temperature and salinity of the sea-water. In many cases the details of these migratory movements are very incompletely known, but a good deal of information has been obtained for some species of fishes. It is impossible to do more than refer, in this place, to these results, and the reader is advised to consult the works mentioned in the bibliography at the end of this article.

Methods
of fish-
ing:
trawling.

Trawling is by far the most important method of fishing employed in the British fishery area. The trawl-net is a very large conical bag of netting which is dragged along the sea-bottom. The meshes of this net vary with the purpose for which it is designed. For the capture of sea-fish the meshes are from $1\frac{1}{4}$ to $1\frac{3}{4}$ inches in diameter, but for the capture of shrimps the mesh is only $\frac{1}{2}$ inch in diameter. The larger trawls employed by steam vessels may be about 100 feet in width at the open end, and about one and a half to twice that distance in length. The mouth of the net is kept open either by being stretched on a beam of wood, carried by two stirrup-shaped iron runners, or it is kept open by being fastened at each end to a heavy, wooden, iron-shod 'board'. These boards are set at an angle to the direction in which the net is being dragged so that they diverge outwards when they are being towed. In all cases the open mouth of the net, when it drags along the

sea-bottom, is fastened to a thick rope, the foot-rope. This on being dragged along the sea-bottom 'scares' the fish there, and they jump over it into the mouth of the net.

Trawling is carried on by both sailing- and steam-^{Sailing trawlers.} vessels. The former are of many different kinds, since trawling may be prosecuted by small half-decked, cutter-rigged boats, carrying a crew of two men, as a rule; or by the traditional smack, a yawl-rigged, fully-decked vessel, carrying a crew of four men. The smaller half-decked boat may cost about £100 to £150 to build; and the larger about £2,000. The smacks have as a rule small steam-boilers and steam-capstans for hauling their nets. The half-decked boats (second-class vessels) work mainly within territorial waters, or not far from the land, and seldom stay at sea for more than a day. The smacks trawl over the greater part of the home seas—in the North Sea, the English Channel, in St. George's Channel, and in the North Sea. They make voyages of seldom more than a week in duration, except when they land their catches by means of carriers, steam-vessels which take the fish from the fishing-grounds into port.

Every year a greater proportion of the trawl-caught ^{Steam trawlers.} fish is taken by means of the steam-trawlers. These are vessels of a very characteristic appearance: they have a small chart-house nearly amidships, they sheer greatly upwards towards the bows, being low amidships so as to enable the trawl to be taken aboard without too much labour; there is little 'top-hammer' on deck, so that they are as a rule very good vessels in a seaway. The larger steam-trawlers may be about 120 feet in length, about 120 tons (net), and may have engines of over 100 horse-power. They carry two otter trawls and fishing is continuous. The net is dragged for about six hours, the crew being engaged meanwhile in gutting, cleaning, and packing the previously caught fish. As soon as one net is hauled, the other is 'shot'. These vessels carry a crew of about eight men, master, mate, two or three 'deck-hands', cook, two engineers, and fire-

man. They may cost about £7,000 to build. They make voyages of varying duration. When fishing in the home seas, the vessel may not be away from port for longer than a week to a fortnight, but a voyage to the Barents Sea or the coast of Morocco may last a month or so. They spend very little time in port, just long enough to land the catch of fish, and take aboard coal, ice, food and other stores, perhaps one to three days. They can keep the sea in almost all weathers.

Drift-net
fishing

Fishes swimming near the surface of the sea are caught, almost everywhere, by means of drift-nets. Such an instrument is simply a wall of netting the meshes of which are about an inch or slightly more in diameter. It is usually about 20 to 25 feet in depth, about 2,500 yards in length, and with an area of over 40,000 square yards. It is weighted at the bottom, buoyed at the top, and floats vertically near the surface of the sea. It is 'shot' at night and hauled in the morning. It drifts in the sea with the tide, and fishes swimming against it 'mesh' themselves by partially penetrating the apertures of the net. Drift-netting is carried on by the familiar little herring 'smacks' as they are sometimes called, sailing-boats which may carry a crew of about half a dozen hands. It is also prosecuted to a large extent by means of steam-vessels. These are rather smaller than steam-trawlers: about 90 feet in length. They cost about £3,000 to build, and the fishing gear may cost over £700.

Line-
fishing.

Fishes living on the sea-bottom are also caught by means of baited hooks, and this kind of fishing is carried on all round the British Islands, and in the northern regions. The lines are laid on the sea-bottom, being buoyed at either end. They may be of almost any length up to the long lines which may carry about 7,000 hooks and be several miles in length. Each hook is attached to a short piece of line called a 'snood', and is baited with herrings, worms, whelks, or mussels; perhaps most often by means of mussels which are 'shelled', that is, it is the soft body of the shell-fish alone which is put on the hook. Vessels engaged in lining may be of almost

any type, from the open rowing-boat employed near the shore, to the steam-liner, or the boats propelled by motors driven by paraffin oil.

There are so many kinds of shore fishing that it is impossible to do more than mention the various methods in use. Stake-netting, trammel-netting, and fishing-weirs are modes of fishing practised on most shores in some form. Stake-nets are vertical walls of netting supported by wooden stakes, and set in a tide-way at low water. Trammels are drifting vertical walls of netting consisting of three nets on the same supporting ropes. The two outer nets are wide meshed, the inner net is narrow meshed. The fish strikes against the inner mesh, forcing it through the wide external mesh, and thus forming a pocket in which it is caught. Fishing-weirs are permanent erections of wicker-work set in tide-ways. Long-shore fishing.

Crabs and lobsters are caught in 'pots', which are wicker-work baskets provided with funnel-shaped mouths. The pot or creel is baited with fresh or decomposing fish, and, being weighted with a stone, it is sunk to the sea-bottom and buoyed. Crabs and lobsters are caught on almost all coasts where the sea-bottom is rocky. Shell-fish.

Shrimping is carried on from small sailing-boats (second-class vessels), using a small trawl-net of about 10 to 25 feet width, and having meshes of $\frac{1}{2}$ inch in diameter. In very shallow water the net may be dragged from a cart drawn by a horse which wades up to its middle in the sea. Sometimes shrimps are caught by 'hose-nets', long cylindrical nets provided with valves or 'pockets', and set in a tide-way at low water. The 'prawn' may be either the true prawn (*Palaemon*), or the 'shank' or 'pink shrimp' (*Pandalus*). Shrimping is the most important of these two branches of fishing. It is carried on extensively on the coasts of Lancashire, in some parts of Ireland, and on the south-east coast of England, but not to a considerable extent elsewhere. Musselling is practised on the coasts of Lancashire and Wales, to the greatest extent. These shell-fish are also obtained from the bays and estuaries on the south and

east coasts of England, and from many places on the Irish coasts. The mussel fisheries on the Scottish coasts are relatively unimportant. Mussels are either picked by hand, or raked from the sea-bottom by heavy iron rakes mounted on long handles and worked from small boats. English native oysters are fished mostly on the south and south-east coasts of England, and in some parts of Ireland and Scotland. In many other places American oysters are imported and relaid in sheltered spots to fatten. Oysters are dredged from the sea-bottom. Cockles are taken on most of the British coasts, but mostly in the Lancashire bays and estuaries and on the south-east coasts of England. They are raked from out of the sand at low water. Periwinkles are also obtained on most of the British coasts: they are picked by hand.

Seine-
netting.

Seine-netting is a method of considerable importance only in relation to the Cornish pilchard fisheries. The net is a very large one, which is 'shot' by being thrown into the sea from a boat which rows out from the shore, so as to enclose the shoal of fish. One end of the net is kept ashore, and the other end is brought in after being taken out to sea round the place where the fish are supposed to be. The net is then hauled ashore. Sparling and salmon are caught by seine-nets on some coasts, and to a small extent other species are also so taken.

From the point of view of the supply of the public markets none of these methods of longshore fishing is of much importance; but collectively they are important from an economical point of view, inasmuch as they afford a large amount of employment.

The longshore fisherman usually practises several methods of fishing according to the season. Often he is also an agricultural labourer; or is employed during the summer in yachting, or catering for the sea-side visitor.

Productivity
of the Brit-
ish sea-
fisheries.

From statistical returns published by the English Board of Agriculture and Fisheries, the Scottish Fishery Board, and the Irish Department of Agriculture and Technical Instruction, it will be found that the most abundant fish in each country is the herring, but this is

mainly an east-coast fish, caught for the most part by Scottish vessels, which also work off the east coast of England. The quantity caught on the west and south coasts is small compared with that taken on the east. Mackerel are the most important fish taken in Ireland and on the south coast of England: this is because this species is a southern one, occurring in greatest abundance in the relatively warm water of the Channel, and in the water of the Gulf Stream Drift on the south and west coasts of Ireland. The principal fish landed on the west coast of England is the hake; this is not caught locally to an appreciable extent, but is taken by steam-trawlers working on the Southern Fishery Regions, and landing their catches at Fleetwood, Milford, Swansea, and Cardiff. Cod, haddock, and plaice are the next most important species of sea fish landed.

TABLE I. *Percentage of demersal fish landed from each of the Fishing Regions of English Ports in 1910 (in cuts).*

<i>The Home Regions.</i>	<i>The Northern Regions.</i>	<i>The Southern Regions.</i>
North Sea . . . 43.93	Iceland . . . 17.27	South of Ireland . . . 10.97
West of Scotland . . . 9.31	Faeroe Banks . . . 6.76	Portugal and Madeira . . . 0.65
English Channel . . . 2.02	Barents Sea . . . 3.80	Bay of Biscay . . . 0.33
Irish Sea . . . 1.98	North of Scotland . . . 1.00	
Bristol Channel . . . 1.28	Rockall Banks . . . 0.49	
West of Ireland . . . 0.16		

Table I shows the percentage of fish of all kinds landed from each of the Fishery Regions, and indicates the relative importance of each of these grounds. The North Sea is the most important area still, both in point of size and productivity, but it is unquestionably the case that the average quantity of fish caught per voyage has decreased for many years; and that some of the other regions—Iceland, the South of Ireland, the West of Scotland, the Faeroes, and the Barents Sea have acquired relatively greater importance. This change is undoubtedly due to the great expansion of the steam-trawling industry. It is also certainly the case that some degree of impoverishment of the North Sea and the other enclosed Home Regions has been effected by reason of intensive fishing;

but this only affects certain species of fish, and the change is apparent mainly in the case of plaice and soles. There is no clear evidence that such fishes as herring, cod, or haddock, are less abundant even in the intensely fished North Sea than they were fifty years ago.

TABLE II. *Total value of all fish landed in 1885 and 1911.*

	1885 £	1911 £
England and Wales	3,957,000	8,051,486
Scotland	1,476,000	3,045,355
Ireland	643,000	315,679
Total	£6,076,000	£11,412,520

Value of
fisheries.

The values for 1885 are only approximately accurate, but the increase between this year and 1911 is certainly very great. The figures give, however, an inadequate idea of the value of the sea-fishing industry of the British Islands, since they represent only the value of the fish when landed at the fishing ports. It is generally agreed that this value must be trebled so as to represent that of the produce when sold to the consumers; and if we also take account of the enhanced value due to processes of curing, preservation, and preparation, the estimate of final value must be still higher. Thus a very large proportion of the herrings caught are cured either as salted herrings for export, as 'kippers', or in other forms. Cod, ling, and coalfish are also salted and dried; other fish are filleted and cured; herrings and some other fishes are canned; fish pastes and other preparations are made and marketed. Crabs, lobsters, and shrimps are 'potted' as preparations of various kinds. Add to all this the now enormous value of the produce sold in the fried-fish shops, and it is not improbable that the total annual value of the produce of the British sea-fisheries approximates to £50,000,000.

Fishing
ports.

The sea-fisheries are carried on all round the coast of the British Isles, but the industry is centralized at relatively few large ports. The nine largest centres, judged by the value of the fish landed, are: Grimsby, Hull, London, Lowestoft, Yarmouth, Fleetwood, Milford, North

Shields, and Aberdeen. The east coast, because of its proximity to the North Sea, possesses the most flourishing fishing ports. The only considerable trawling centre in Scotland is Aberdeen, but the north-east ports such as Fraserburgh and Banff are considerable herring fishing centres. The west and south coasts of England are far behind the east, and there is no really first-class port in the English Channel. The coast of Wales, as well as that of western Scotland, is of relatively little importance, for though sea-fishing is carried on at almost every little creek or harbour, the numbers of men and vessels employed are small, and the employment is often occasional. The fisheries of the Isle of Man are of little importance, even locally, although the sea adjacent to the island is exploited by Lancashire and Cheshire vessels. The Irish fisheries themselves are also relatively unimportant. The vessels employed are small, and few steamers are registered in the country. But the sea round Ireland is very productive, and is extensively fished by steam-vessels from Fleetwood, Cardiff, Milford, and Liverpool.

1. The Natural History of Edible Fishes; Cunningham's *Marketable Marine* (Biblio. Fishes, Marine Biological Association, 1896). 2. Legislation: Johnstone's *graphy. British Fisheries*, Williams & Norgate, 1905. 3. Scientific Investigation: Johnstone's *Life in the Sea*, Cambridge University Press, 1908; the periodical publications of the International Council for the Exploration of the Sea—these are published by the Bureau of the Council at Copenhagen. There are various series: the *Bulletins*, dealing with oceanographical investigations; the *Supplément à l'Exploration*, dealing with other fishery investigations; and the *Publications de Circumstances*, also dealing with various fishery researches. 4. Periodical official publications: The *Annual Reports of Proceedings under the Acts relating to Sea Fisheries*, and some Blue Books dealing with statistical results, and published by the English Board of Agriculture and Fisheries. The *Reports of the Scottish Fishery Board*, published in three parts. Part I deals with statistics and administration; Part II with the Salmon Fisheries; and Part III with scientific investigations. The *Reports of the Irish Department of Agriculture and Technical Instruction* include statistical accounts of the Irish fisheries, and also the results of scientific researches. The *Annual Reports of the Lancashire Sea Fisheries Laboratory*, Liverpool, deal with scientific investigations made by the Lancashire Sea Fisheries Committee. 5. Reports of Royal Commissions and Departmental Committees, numerous, see Annual Indexes to Parliamentary Papers.

CHAPTER VI

AGRICULTURE

BY A. D. HALL

Factors
in agricul-
tural de-
velop-
ment.

THE agricultural development of any country is determined by three main factors, the climate, the soil, and the people, though the exact degree of action of these various factors may not always be easy to express. Together they have given the agriculture of the British Isles both great individuality and considerable variety. Speaking generally the British Isles are intensively cultivated, the amount of land available being small and the agricultural population highly skilled in their industry. At the same time the proximity of valuable industries with a high rate of wages have drawn the agricultural population off all land that does not yield a high return to the cultivator, and in consequence there are in the British Isles many comparatively large areas which can hardly be said to be farmed at all, though they pay a trifling return per acre on an inconsiderable expenditure for labour. The density of the agricultural population in England averages about 125 per square mile, in Ireland about 190, both very high figures as compared with America and other new countries, but far below those which prevail in India, China, and Japan. They are also exceeded on the continent of Europe in Belgium, Holland, and Denmark, though not to any marked degree. The average yield per acre is only exceeded in Belgium, Holland, and Denmark; for example the average yield of wheat in the United Kingdom is about 32 bushels per acre, in Belgium it is 35, in Holland 34·5, though it is grown in these countries only on comparatively small acreages; whereas in France it is under 20, in Germany 29·5, and in the United States only 13·7, the approximate average for the whole world being 13·2 bushels per acre. If the

comparison were made out for some of the fodder crops or for live stock it would be still more favourable to the British Isles.

The climatic factors of importance to agriculture include ^{(Climate.} the rainfall, the temperature, the exposure, and elevation. Though the British Isles from their situation on the edge of the western seaboard and in the direct track of the Atlantic cyclones possess in the main a uniform and equable climate with a rainfall very regularly distributed throughout the year, two distinct types of climate may be distinguished within the area. Ireland, the greater part of Scotland, and the west of England possess a distinctly oceanic climate characterized by high humidity and no great range of temperature. The east of England and the east midlands partake to some extent of the continental climate, with lower rainfall, cold winters, and comparatively high temperatures in summer. Roughly it may be said that the continental type of climate is more suited to arable farming, the oceanic to grazing.

The rainfall acts as a negative factor as regards the ^{Rainfall.} growth of cereals. About 15 inches per annum may be taken as the lower limit necessary, so that the whole of the British Isles gets rainfall enough for the growth of the hardier cereals. Their cultivation on any large scale, i.e. the arable land, is however almost restricted in the British Isles to the area with less than 40 inches of rain annually, barley being the most susceptible, then wheat and lastly oats, to damage from a high precipitation. Excessive rainfall injures cereals in two ways. In the first place dry weather is necessary to ripen the grain off in time and to permit of its being harvested in good condition. In the second place excessive rain in the late autumn and early spring may interfere with the preparation of the land and the sowing of the crops. This latter cause is largely operative in reducing the arable area in the west of England, where only the lighter lands are under arable cultivation. In Scotland the arable cultivation is chiefly restricted by the difficulties of a late wet harvest. Cereals may be grown in other countries with

a much higher total annual precipitation if the rain is concentrated into the early summer months, as for example in the eastern states of North America, where an annual rainfall of about 50 inches yet permits of a hot dry spell at the close of the summer during which the harvest work can be carried out. For the development of good pastures not only is a high rainfall beneficial, but a humid atmosphere and the absence of any long period of drought are necessary for the growth of the many varieties of grasses. Comparatively high winter temperatures are also desirable, especially to maintain the continuous growth which will support live stock at all periods of the year. In consequence, the oceanic climate which prevails in Ireland and the west of England is most suitable for the grazing industry. Owing to grazing being the cheapest method of farming, the great fall in the prices of cereals which set in from about 1875, with the development of exports from North America, Argentina, &c., resulted in an enormous extension of the grass area of Great Britain at the expense of the arable land. This process has continued into the present century but now seems to have reached its maximum, and with the tendency of wheat prices to rise, a return to arable farming seems to be setting in on a good deal of the land that has been laid down to grass within the last generation.

Tempera-
ture.

The whole of the British Isles lies within the isotherms which permit of the growth of winter wheat, barley, and oats; the restricted cultivation of wheat in Scotland, for example, being in the main due to the difficulties associated with rainfall. Of the other crops mangolds reach their northern limit in the south of Scotland and are not cultivated to any great extent north of Yorkshire, the deficiency of summer temperatures being the limiting factor in their case. Lucerne is still more restricted by the deficient summer temperatures and is but little grown north of the Thames valley. Hops are confined to two areas in the south of England, and though most varieties of fruit can be grown all over the British Isles where the elevation is not too great, the commercial production of

apples, pears, and plums does not extend much north of the Trent.

The question of average temperature is perhaps less Exposure and elevation. important than the local temperature, which is determined by exposure and elevation. For example, the equalizing action of large bodies of water upon temperature is particularly shown in the way certain areas of the seaboard are suitable to the growth of early potatoes because of the rarity of the occurrence of spring frosts. The earliest British-grown potatoes to reach the markets come from Jersey, where their cultivation constitutes an important industry. A little later come potatoes grown on similar soils in Cornwall, and to a limited degree in Kerry and Waterford. These are shortly succeeded by potatoes grown on the sea-coast of Ayrshire, and the crops from the seaboard of Lancashire and Cheshire and the mouth of the Thames follow closely.

The cultivation of crops for seed is also largely determined by temperature factors. For the cruciferous crops, turnips, cabbage, &c., mild winters are necessary to prevent damage to these biennial plants in the first stages of their development. A dry summer is also necessary for the harvesting of the seed. In other cases a dry summer is the more dominant factor, but as a general consequence it will be found that the cultivation of cruciferous crops, clovers, &c., for seed is confined to the east of England and particularly to the seaboard of Kent, Essex, and Suffolk. Fruit crops of all kinds are also particularly liable to damage from late spring frosts, and as inland such frosts are always most intense at the bottom of the valleys the chief fruit plantations are always at some elevation above the river level, especially as the high day temperatures which also prevail at the bottoms of valleys cause a premature development of the blossom buds.

The whole of the soils in the British Isles belong to soils, what are termed in a genetic classification *Podzol*—soils which have been subjected to a considerable amount of washing by rain and have in consequence lost the greater

part of the soluble materials arising from the decomposition of the original rocks. Only in the peaty areas and the Fens do we find soils in which organic matter formed *in situ* predominates. The character of the soil under cultivation and its suitability for farming purposes is to a large extent conditioned by the prevailing rainfall. Thus a soil in which sand predominates would be too light for wheat in the east of England, but becomes suited to all forms of arable farming under the heavier rainfall of the west, while on the contrary heavy loams that are valuable for arable farming in the east are too retentive of wet to be fit for anything but grass on the western side of the country. Speaking generally, the heavier soils are better adapted to the growth of grass, wheat, beans, and mangolds, while lighter land is more appropriate to turnips, potatoes, and barley, and the relative distribution of these crops will be found to be largely determined by the character of the soil that prevails. Over a large part of the British Isles the soils are not derived directly from the underlying rocks; for example, Great Britain north of the Thames and the north of Ireland are covered with a drift formation of glacial origin out of which the soils arise, and though in many cases these drifts have not travelled far and partake of the character of the underlying rock, only the 'drift' and not the 'solid' geological maps supply any interpretation of the character of the soil. Speaking generally, the drift soils are somewhat lighter than the sedentary soils arising from the same rock, because the finer particles have been partly washed away during the transport and redeposition of the drift. Thus the heaviest clay soils in the British Isles are the sedentary soils of the south and east which arise *in situ* from the weathering of the Oxford Clay, the London Clay, and the Weald Clay. The distribution of 'early' soils is largely governed by geographical factors. An early soil should be light in texture so that it does not hold much water, cooling by evaporation being the factor which mostly retards the warming up of the soil in spring; it should not be elevated, and the

proximity of a large body of water is desirable in order to secure equable winter temperatures and the absence of late frosts. The thin alluvial sands and gravels in the Thames valley, the soils derived from the Lower Greensand of the Bagshot Beds, the lighter granitic soils of Cornwall, form good examples of the early soils of Great Britain. Of a very similar type are the soils most suited for small holders, which should above all things be early and easy to work, so that as far as possible the occupier may obtain more than one crop during the year. The soils above mentioned and those derived from the New Red Sandstone are on the whole the most successfully cultivated by small holders. Wastes and commons are generally situated upon land which is either too light or too heavy for profitable cultivation, generally the former, because a heavy land would continue to yield some return for a long period at a time when labour was cheaper and there were no artificial manures to bring in extraneous fertility, whereas the very light soils will only yield minimal crops unless plentifully supplied with manure. Putting aside the wastes which are due to the elevation being too great for the profitable development of crops, the commons and heaths of England chiefly occur upon the Bunter beds of the New Red Sandstone, the lighter beds of Oolitic series, the Lower Greensand and Bagshot Sands, and the bare elevated chalk areas together with occasional patches of heavy clay land. The New Forest forms a typical example, the greater part of it lies upon thin barren sands of Bagshot and Oligocene origin, while some of the tracts are situated upon exceptionally heavy London Clay. Most of the wooded areas of Great Britain, especially the remains of old forests, are situated upon heavy clay land at a considerable elevation, so that they are subject to a high rainfall and low temperatures for growth.

The most characteristic feature of the agriculture of Great Britain is that the greater part of the land is farmed by comparatively large tenant farmers holding from 200 to 500 acres of land and possessed of both a considerable

Farmers :
size of
holdings.

amount of capital and a high standard of cultivation. On less than 12 per cent. of the land are the occupiers owners, and the occupier-owners have steadily decreased of late years. The average size of a holding in England is 65 acres, in Wales 46 acres, and in Scotland 62 acres, but the variations are much greater in particular districts, being over 100 in Wiltshire and Northumberland, and 155 in the Lothians, while it falls as low as 40 in North Wales, and 22 in the northern districts of Scotland. About two-thirds of the total number of owners occupy less than 50 acres of land. The British system of land tenure with its comparatively large holdings is in the main the outcome of the enclosures of the old common fields which took place most markedly towards the end of the eighteenth century. In a few districts the land has not been enclosed but is still held in narrow strips of one-acre and half-acre pieces. Examples of this are still to be seen in the island of Axholme.

System of
tenant
farming.

In the British system of tenant farming the owner not only provides the land and buildings but is also responsible for all the permanent improvements upon the farm, and continues to supply material for gates, fences, drains, and repairs to the fabric. He thus becomes a very considerable partner in the farming enterprise, and it has been shown that on many of the large estates the rent does not represent a commercial interest on the capital that has been expended on the land during the last century, without allowing any value to the land itself. The development of British farming and the comparatively advanced stage it has reached have been due to the manner in which the tenant's capital has thus been free for the purposes of his business; he has been tempted to embark his capital freely by possessing a practical security of tenure and yet no obligation to remain if the business became unprofitable. The majority of the farms in Great Britain are held on yearly tenure, long leases being uncommon. The effectiveness of the system may be judged not only from the comparatively high yields per acre but also from the immense improvement that has

been effected in the breeds of live stock, chiefly by tenant farmers. The conscious formation of specific Live stock. breeds of live stock began in England in the latter part of the eighteenth century, and in no other country has attained to such a degree of perfection.* As a consequence the newer countries which have been so largely opened up during the nineteenth century have been peopled almost exclusively with British breeds of live stock. The great cattle ranches of America, Argentina, and Australia are exclusively occupied by British stock, chiefly Short-horns and Herefords, and certain British races of sheep have an equally wide distribution: in fact the only continental races that have been developed out of their own districts are the Holstein-Friesian dairy cattle and the Merino sheep. At the present time Great Britain is still resorted to by the breeders of all countries for sires whereby to improve their country stock and a valuable export trade in pedigree animals is carried on.

One of the most marked features of English farming is sheep, the number of sheep that are carried. At the present time there are about 30,000,000 sheep in the United Kingdom as compared with about 17,000,000 in France and only 7,000,000 in Germany, and though the British numbers are exceeded in Australia with over 93,000,000, Argentina with 75,000,000, and the United States with 53,000,000, the density of the sheep in Great Britain is far greater than in any other country. In England also the sheep are almost as abundant on the arable land as on the grass, because of the practice prevailing on all the lighter soils of consuming turnips and other green crops by sheep folded on the arable land. In this way sheep become part of an intensive system of farming instead of being used to range over a poor grassland as they do in most other countries.

It is difficult to trace any general causes at work in the distribution of large or small holdings. Poor land that is still fit for arable farming is generally divided into extensive farms, as for example the land lying on the chalk, where the holdings are very often of 800 acres and

Distribu-
tion of
large and
small
holdings.

upwards. On the other hand, the poorest land in the country is often cut up into comparatively small farms because it has never been sufficiently tempting to the large capitalist farmer. Examples of this may be seen on the thin soils of the Lower Greensand, the Bagshot Beds, the Weald of Sussex, &c. Light soils in the neighbourhood of good markets are generally occupied by small holders engaged in market-gardening, milk-production and other intensive forms of agriculture demanding a good deal of labour. Examples of this may be seen in the county of Cheshire, the light soils of Bedfordshire, and the gravels and sands in the neighbourhood of London ; while in Cambridgeshire and in the valley of the Avon near Evesham we get examples of small-holding communities engaged in fruit-growing and market-gardening, where the factor bringing about the division of the land has been its suitability for intensive cultivation. In Ireland, in Wales, and in Scotland away from the rich arable land in the eastern straths, we find the land divided into small grazing farms occupied by comparatively poor men employing little or no additional labour and content to work for a small pecuniary return. Finally, on the extreme western seaboard of Scotland and Ireland where both the land and the climate are unfavourable to agriculture we have a population of crofters tilling very small areas for a bare subsistence, far below the usual economic level prevailing in the British Isles.

Scotland. The cultivated land in Scotland is confined to the fringe of lowland on the eastern coast, the broad river valleys and straths and the western seaboard of the lowland counties below the elevation of 600 feet or so. Of the cultivated land the greater proportion is under arable cultivation, but a large proportion of this is occupied by temporary grass which is left down for two or three years before coming into crop again. For example, in Forfarshire, one of the most highly farmed counties, out of a total of 559,000 acres there are about 248,000 acres under cultivation of which only 28,000 lie

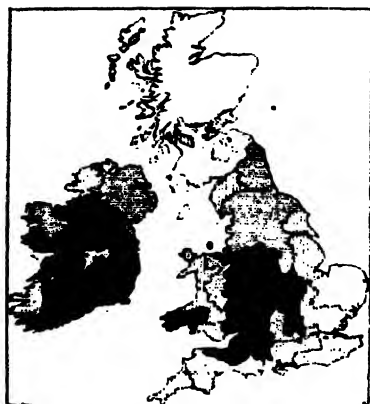


FIG. 41. Distribution of Rich Pasture in Britain. Black, counties with over 500 acres per 1,000 acres; horizontal lines, 375-500 acres; vertical lines, 250-375 acres; dots, 125-250 acres; white, under 125 acres.



FIG. 42. Distribution of Arable Land in the British Isles. Black represents counties where over 500 acres in every 1,000 are ploughed; horizontal lines, 375-500 acres; vertical, 250-375; dots, 125-250; white, under 125.

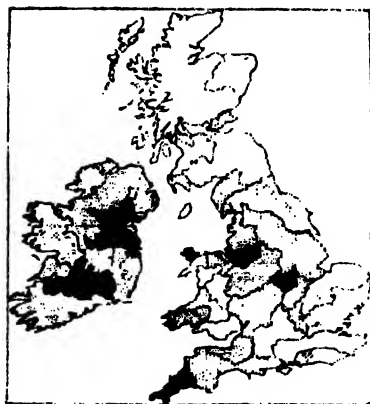


FIG. 43. Distribution of Cattle in the British Isles. Black, over 25 cattle per 1,000 acres; horizontal ruling, 200-250; vertical ruling, 150-200; dots, 100-150; white, under 100.

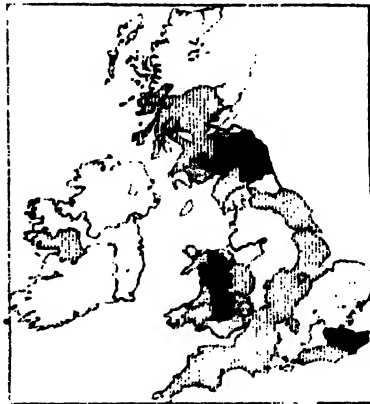


FIG. 44. Distribution of Sheep in the British Isles. Black, over 800 sheep per 1,000 acres; horizontal ruling, 600-800; vertical ruling, 400-600; dots 200-400; white, under 200.

in permanent grass ; of the remainder about two-fifths carry corn crops, two-fifths temporary grass, and one-fifth roots of various kinds, and this proportion is typical. Scottish farming generally is distinguished by a very high level of skill, culminating in the Lothians, where the most highly developed arable farming in the world may be seen. The statistics of production bear evidence of the general excellence of Scottish agriculture. For example, the average yield of barley in Great Britain for the ten years, 1901-10, was about 33·5 bushels per acre ; during the same period in Forfarshire it was 39 bushels, and in Haddington as high as 41½. Similarly the average yield of potatoes in Great Britain during the same period was about 6 tons per acre, but in Perthshire 7, and in Mid-Lothian 8. Stock breeding has been raised to an equally high pitch. Of late years the most highly esteemed race of Shorthorns, commanding exceptional prices in the export market, have come from the valleys of Aberdeen, Perth, Forfar, &c.

Agricultural divisions of Scotland and their characteristics.

The Scottish districts may now be taken in detail. In the extreme north, in Caithness and round the shores of the Moray Firth, there will be found an area with a low rainfall, below 30 inches, and a comparatively high temperature in summer. This district when not too far removed from the sea nor too elevated is highly farmed, and produces in particular valuable crops of oats and potatoes. The lowlands of Aberdeenshire and the valleys of the Spey, Dee, and Don, are also highly farmed, though the climate is on the whole less favourable than in the district first mentioned. The distinctive feature of this district is the fattening of the highest grades of beef for the London market. Large turnip crops are grown and drawn off the land for the winter feeding of the Aberdeen-Angus and Shorthorn cattle, which are bred in great perfection locally, this indeed being the original home of the former race.

Below Aberdeen we enter upon the highly farmed Strathmore, which traverses Forfarshire and the south of Perthshire. In this district mixed farming prevails ; in

Strathmore itself a good deal of barley is grown for the distilleries, and potatoes form a very important crop, especially for seed purposes, Scotch seed from this district having proved to yield the best crops when taken down into the great potato-growing districts of Lincolnshire and the south of England. Near Blairgowrie there has of late years been a very special development of raspberry growing, together with a certain amount of strawberries and other small fruit. In this district should also be included the Carse of Gowrie on the shores of the Tay, east of Perth, a region of heavy low-lying alluvial land which under good farming can be made to yield very good crops. The Lothians, which for farming purposes may be taken to include the whole of the low-lying land between the Pentland and Lammermuir Hills and the Firth of Forth, is the most notable farming district in Scotland. It is wholly under cultivation and on the best of the land very few stock are kept, the crops being almost wholly sold away. The chief crops are potatoes, barley, oats, and hay, wheat being but little grown, though the acreage is tending to increase again. The very pick of the land is an area of light red soil lying close to the sea in the neighbourhood of Dunbar where large tracts let at as much as £4 per acre. The main-crop potatoes from this district, known as Dunbar Reds, command the highest prices in the English markets. On the east of Scotland, on the coast of Ayrshire from Ardrossan to Girvan, lies a highly farmed arable region close to the sea notable for its production of early potatoes. Only a small part of the land is available for this purpose, where the proximity of the sea saves the crop from the danger of spring frosts. The rest of the south-west of Scotland, from Dumbarton round Dumfries, is mainly a stock-farming country, though a large proportion of the land is under the plough, oats and turnips being the staple crops. Dairy-farming for the production of milk and cheese is perhaps the most important branch of the industry, and this district is the home of the Ayrshire cattle, one of the most important of all the dairy breeds.

At the same time there is a good deal of stock-raising for the sale of stores to be fattened in England ; the native polled Galloway cattle and again the ' blue grey ', crosses of Galloway with a white Shorthorn bull, possess a very high reputation for this purpose. The uplands of the south of Scotland are occupied by sheep, the more important breeds being the Scotch Blackface sheep, the Cheviots, which have extended across the border, and various cross-breeds in which Leicester sheep and the Oxford Downs are most prominent.

England :
divisions.

English farming is remarkable for its extreme diversity and for the multiplicity of the breeds of sheep and cattle there prevailing. Broadly speaking the chief arable farming districts occupy the lower ground round the east and south coasts. Down the centre of the country a belt of almost pure grassland stretches from the Border to the Midlands on either side of the central backbone of the country, and this merges into a transverse belt of grassland on the Lias and Oolitic Clays, which extends across England from Dorsetshire to Yorkshire. North-east of this is an area of arable farming, chiefly upon the New Red Sandstone formation in south Lancashire, Cheshire, Shropshire, and Staffordshire, beyond which the grassland sets in again in the border counties and throughout Wales. As has been mentioned above, the live stock are extremely varied and it is almost impossible to trace the origin of the various breeds. We may, perhaps, distinguish three primitive stocks. In the west the Celtic race of cattle, notable for the richness of their milk, all show a light somewhat deer-like frame, with some black body colour. To this group belong the Channel Islands cattle, the black and white cattle of Wales, the Kerrys of the south of Ireland, and again the black and white cattle of Brittany. A little nearer the centre come the deep-red cattle, which have given rise to the Devons, Sussex, and Hereford races, and probably to the Lincoln Reds and the Norfolk Red Polls. The Shorthorns, among which a roan coloration alone appears, contain a later infusion of blood ; they originated in Teesdale, but are

now the most prominent cattle all over the Midlands of England and in Ireland.

Northumberland, north of the coal district, possesses ^{The North.} a fringe of arable land on the seaboard, merging into the Border farming country and Tweedside, both at Berwick and by the broad valley of the Till. Most of the soil is of drift origin and light. The land is held in comparatively large farms, which are worked on the Norfolk four-course rotation. The farming differs from that of the Lothians in that stock form the main source of profit, the roots being partly folded and partly drawn off for the fattening of cattle in the winter. Potatoes are not extensively grown, and barley is the chief crop to be sold. The uplands near the Border are the native home of the Cheviot sheep, but on the better land Border Leicesters are very largely kept, together with a certain number of Oxford Downs. Northumbrian farming is very good; the live stock are excellent and a high pitch of fertility is maintained on the land, another notable feature being the high rate of wages paid to farm labourers. The rest of the northern country, including the great masses of moorland which make up Cross Fell, the Lake District and the Dale country of Durham and north Yorkshire, is nearly all given up to stock-raising: almost the only arable farming is that which takes place along the Solway and the Eden valley. Over the whole of this district a very fine class of cattle is raised, especially Shorthorns of the milking type, for which there is a continuous demand from the dairymen of the large Lancashire and Yorkshire towns. The cattle occupy the better land in the valleys, while the uplands and moors are ranged by sheep of which several distinct breeds can be identified. The general stock—Swaledales, Lonks, and even the Gritstone sheep of Derbyshire—is clearly akin to the horned Scotch Blackfaces, but the Lake country possesses a very distinct breed of its own, the Herdwicks, and on the better land in the valleys may be found a large breed allied to the Leicester sheep, known as the ^{The North-east:} Wensleydales. Below the Dale country the Vale of York

Yorkshire and Lincolnshire. **and Vale of Pickering** form a rich and well-managed farming country, with no very distinct characteristics, east of which come the Yorkshire Wolds, the most northern section of the chalk, and, like most of the chalk, chiefly given up to arable farming and sheep. On the Yorkshire, as on the Lincoln Wolds, a strict four-course rotation of turnips, barley, clover, and wheat is followed, the turnips being eaten off on the land by sheep. Beyond the Wolds comes the low-lying peninsula of Holderness, where the chalk is deeply covered by thick formations of drift, giving rise to heavy soils that are in the main well farmed. The eastern side of Yorkshire is also notable for its light horse-breeding; thoroughbreds and hunters are generally raised, while the northern vales are the home of some of the finest harness horses of the Cleveland Bay and the Yorkshire Coach-horse breeds. The Yorkshire plain passes insensibly into the area of alluvial flats which begin round the mouth of the Humber and extend almost continuously by the lower valley of the Trent and the Witham Gap at Lincoln to the Lincolnshire flats and the **Fens.** **The Fens.** In the Humber levels, the Lincolnshire levels near Boston, and the seaward side of the Fens, from Spalding through Wisbech to King's Lynn, the soil is an alluvial silty deposit, which in places has been accumulated artificially by the process of warping, a method of reclaiming land which is still going forward in the Humber estuary. The silt or warp land constitutes one of the finest soils of the country; it is all under arable cultivation and carries immense crops of potatoes and wheat.

Of late years fruit has been extensively planted on this land in the neighbourhood of Wisbech, the industry having extended from an older area of fruit-growing on what is known as the Shelf land in the neighbourhood of Cambridge and round the edge of the Fens. Inland of the silt areas, as for example in the neighbourhood of Peterborough, Ramsey, and Ely, come the black soils which we may suppose to have been formed in comparatively clear water of the swampy Fen area, while the silty deposits were laid in the tidal estuaries of the rivers entering the

Wash. The black soils of the Fens are famous for heavy crops of comparatively poor quality. Very few stock are kept on this land and the soil is so rich that farmyard manure possesses little value. Wheat, oats, potatoes are the standard crops, and both on this land and on the neighbouring silt a number of small holders are to be found who can raise cheap crops on the fertile soil, celery, asparagus, buckwheat, flax, mustard for seed, even poppies, being among the uncommon crops which may be seen in this district. The black land of the Fens is, however, of limited depth and slowly disappears under cultivation, so that in many places the underlying clay has already been reached. The whole of this area of silt and Fen land, from the Humber mouth to the Wash, is below high-water mark and requires to be drained artificially and protected from the inroads of the sea. The drainage operations have been carried out by various bodies of adventurers, from the times of Elizabeth down to the present day, and have resulted in a tangled system of water-courses and authorities. In nearly all cases the drainage water from any particular area has finally to be lifted into one of the channels which discharge into the sea by gravitation, and this lift is entrusted to wind-power in some of the smaller levels, but generally requires a service of steam pumps. Certain islands of clay soil arise out of the black Fen, and these form the chief home of the heavy horse-breeding of the country, Peterborough being the most famous market for shire horses. Although a large part of Lincolnshire thus consists of flat land of great fertility, the county also contains two areas of upland - the Wolds, which in their farming are very similar to the Yorkshire Wolds, and Lincoln Heath, a ridge of light oolitic sand, stretching from the Humber to the Wash, and only recently brought under cultivation. A barren sheep-walk a century ago, Lincoln Heath is now excellently farmed and famous for barley and peas. Parallel to Lincoln Heath, on the other side of the Trent, occurs a scarp of New Red Sandstone, rising in a series of islands out of the Fen, one of which is the

Island of Axholme, to which allusion has already been made.

The West. Turning now to the west of England, the seaboard of Lancashire, south of the Lune. Cheshire, a large part of Shropshire, and Staffordshire, form a plain lying upon the New Red Sandstone and covered by drift soils largely derived from the New Red. The land is in the main light and suitable for arable cultivation, potato-growing being very prominent in south Lancashire and throughout Cheshire, while in Shropshire lies the only considerable area of barley in the west country. Owing to the proximity of the manufacturing districts of Lancashire and the Potteries, vegetable-growing is extensively carried on over the whole of this area, and milk-production is also important, particularly in the Fylde, between the Lune and the Ribble, and in Cheshire.

The Midlands. The Midlands of England constitute in the main a great grazing area, from Derbyshire down to the Thames valley. This is determined in part by elevation, but also by the predominance of heavy soils derived from the Oxford and Kimmeridge Clays and the Lias. Derbyshire is largely engaged in dairying, but the great grass counties of Leicestershire, Rutland, Northamptonshire, Huntingdonshire, so famous for their hunting, are largely given up to fattening store cattle, brought from Ireland and Wales, upon the rich grass in the summer. Dairying both for the sale of milk and the manufacturing of cheese is, however, very general throughout this area and tends to increase; the Lias outcrop is sometimes credited with being the great milk-producing area of England. In the west Midlands, in the valleys of the Avon, Severn, and the Teme, occurs a distinctive area of more mixed farming; here the soils are easy to work, the climate soft and sheltered, and we find the better land largely given up to hops and fruit. In the Avon valley, round the neighbourhood of Evesham, occurs a remarkable area of intensive fruit- and vegetable-growing, asparagus being a notable crop. The hop-growing lies mostly to the west of the Severn, in the valleys of the Teme and the upper Wye

tributaries in Herefordshire. From these rich valleys the land rises on the one hand into the forest country which can best be dealt with under the heading of Wales, and on the other to the high Cotswold ridge which divides the Midlands from the Thames valley. The Cotswolds, especially on their southern flanks, are mostly under arable cultivation and possess light brashy soils with clays in the hollows, where the heavier formations of the Oolitic series are exposed. The Cotswolds have given their name to a race of heavy long-woolled sheep which, however, are rarely seen now in their native country, where they have given place to the Oxford Downs, in the formation of which the Cotswolds had a share. Opposite the Cotswolds, across the upper Thames valley, rises the great central mass of the chalk, occupying almost the whole of Wiltshire and Hampshire, and throwing off one arm westward into Dorsetshire, another north-eastward, which crosses the Thames as the Chilterns and then becomes the East Anglian Downs, the uplands of Norfolk, and finally the Wolds, while from the southern part of the *massif* the two arms of the North and South Downs project eastward. A great similarity pervades the whole of the farming on the chalk in the south of England, except that in the east, both over the Chilterns and the North Downs, the chalk is apt to be obscured by a thick formation of clay-with-flints, on which ordinary mixed farming takes place, with woodlands wherever the elevation is above 400 feet. In the chalk area proper the farms are mostly extensive, and almost invariably take the form of strips which start with some grassland in the low country and run up the hill, giving rise successively to heavy arable land on which two corn crops can be grown for one green crop, then to ordinary chalk loam on which green crops and corn alternate, and lastly on the top to the open grass down with a few fields of very thin arable land. All the chalk land is characteristically open and unfenced and wood is rare, the beech forests of the Chilterns, &c., generally occupying caps of deeper drift soils. Sheep form the mainstay of the

The Cotswolds.

The South-east : the Chilterns and the Downs.

East
Anglia.

farming and a number of crops, especially rape, vetches, rye, winter barley, are grown to be consumed by the sheep on the land. Over the western part of the area it is the general custom to grow the green crops for two consecutive years, during which period at least three of these catch-crops can be taken ; wheat is then grown and followed by barley. The sheep on the chalk almost wholly belong to one or other of the Down breeds, the parent stock being the South Downs, which were raised little more than a century ago in the neighbourhood of Lewes, from the old short-woolled hill sheep, which seem to have occupied the uplands of the south and midlands. The South Downs are the smallest of the Down breeds, and the larger Hampshire, Dorset, Oxford, and Suffolk Downs have been raised by crossing upon one of the larger local races belonging to the lowlands. Live stock upon the chalk are always healthy ; the grass, however, is rarely rich enough to carry horned stock, and the lack of water upon the uplands, where the water-table is often 200-400 feet below the surface, also prevents much development of dairying. In Norfolk and East Anglia, although the chalk is the predominant geological formation, it is so obscured by drift formations that neither soils nor agriculture are those typical of the chalk. The northern part of Norfolk is covered by light sandy soils which are almost wholly under the plough and are kept at a very high pitch of cultivation. The four-course rotation to which the county name has been attached is now rare ; instead, as a rule, two corn crops are grown after the roots. The roots, moreover, are to a large extent drawn off the land for the winter fattening of bullocks, for which Norfolk is famous. In south Norfolk and Suffolk the land is heavier, but the whole district is under the plough and forms one of the great wheat and barley areas of Great Britain. In Essex and Hertfordshire the land is heavier and on the whole poor ; some of the heavy land on the London Clay in Essex became notorious a generation ago for the number of farms that had been abandoned as unprofitable with the falling prices for cereals. This derelict land, however,



PLATE XXV. HILL COUNTRY BORDERING THE WEALD, SOUTH-EAST OF ENGLAND

(Phot. W. M. Steener)



PLATE XXVI (a). A MERE IN NORFOLK, EAST ANGLIA



PLATE XXVI (b). HEAD OF BUTTERMERE, LAKE DISTRICT
OF ENGLAND

(Photo. O. J. R. Howarth)

has largely gone down to grass and become profitable again for the production of milk for the London market. The seaboard of Sussex and Essex is occupied by marshes, rich alluvial grazing land reclaimed from the sea and protected from it by embankments.

London naturally exerts a great influence upon the agriculture of the surrounding country; the gravels, brick-earths, and other alluvial soils are mostly given up to market-gardening, as for example in the neighbourhood of Mitcham, the Thames valley to Twickenham, and on the light sands and loams in north Kent, as far as Dartford and Gravesend. Where the London Clay comes close to the city, as in Hertfordshire and Middlesex, grass still prevails and used to supply the London horses with hay, but now, owing to slackening of the demand, the land is being more and more given up to dairying. Market-gardening sets in again on the light soils of the Lower Greensand in Bedfordshire and on the Hertfordshire gravels; on the sandy soils of north Kent and the chalk loams of Surrey intensive potato-growing may be seen, dependent upon the supplies of manure that can so readily be brought from London. A special feature of the Lea valley from Hertford downwards, especially near Cheshunt, is the prevalence of fruit and vegetable cultivation under glass, tomatoes, cucumbers, and grapes being the most important crops. Other centres for this work are Swanley Junction, in north Kent, Worthing, and the island of Guernsey.

Kent, Surrey, and Sussex form a well-marked natural area—the Weald, with the ring of the chalk Downs surrounding it, except where they have been cut away on the eastern seaboard. The Weald proper is mainly an elevated region of poor sands and clays, covered with forest and heath, but giving rise to some rich soils in the western river valleys. The Greensand area between the Weald and the chalk also carries poor heath land, except in the neighbourhood of Maidstone, where the presence of some calcareous matter in the rocks gives rise to a rich soil. It is, however, the Tertiary and drift soils on the

flanks of the chalk which have made Kentish farming famous, and here are situated the rich highly-cultivated orchards and hop gardens which extend along the course of the Medway and its tributaries, across the Greensand, and deep into the Weald. The seaboard of Kent and Sussex is also fringed by extensive grass marshes, famous for their sheep—a big long-woolled type, probably of Flemish origin, like so much of Kentish agriculture. Seaward of the Downs in Sussex, between Portsmouth and Worthing, comes a low-lying flat plain covered by deep alluvial soil of great richness, the maritime area of Sussex, one of the finest corn-growing districts in England.

The South-
west.

In the south-west of England, as soon as the chalk with its characteristic farming has been left, one passes in Dorset into a grass country of no particular richness and largely given up to cheese-making, but in Somerset, in the Vale of Taunton, comes an area of very rich arable land lying upon the New Red Sandstone and the lighter Oolitic beds, a justly celebrated barley-growing country. In Somerset again begin the orchards, not so much for the production of table fruit as for cider, like the orchards of west Worcestershire, Herefordshire, and Gloucestershire. The orchards continue into Devon, where there is some very good arable land along the south coast and in the neighbourhood of Tavistock, though the county is chiefly given up to the production of milk. The dairying industry is in fact extremely important both in Somerset and Devon. Somerset being the native home of the Cheddar cheese, the most widespread of the English cheeses, made also not only in the south of Scotland but to an enormous extent in America and Australia. The same mixed farming prevails in Cornwall, but the south-west of the county by the seaboard possesses a number of light early soils, which are used for the production of vegetables, early potatoes, &c., for the London market.

Wales.

It has already been stated that the holdings in Wales are in the main small, and because of the elevated nature of the country and the high rainfall only a small proportion

of the land is under arable cultivation, except on some of the alluvial soils in the valleys and in Anglesey. The uplands are chiefly occupied by sheep, of which two races may be distinguished—the true mountain sheep and the forest sheep, which more properly belong to the march counties, Radnor and Montgomery. From the latter stock one or two distinct breeds have been segregated: indeed the widely distributed Shropshire breed has originated from it through a certain infusion of South Down blood. Wales also possesses a distinctive race of cattle, mainly black in colour, though sometimes spotted or even sheeted with white. They are good milking cattle, and in the Principality are kept for dairy purposes, the bull calves being grown on and sold as young store cattle, to be fatted on the Midland pastures. The Welsh Runts, as they are termed, are thrifty and hardy graziers, though they do not grow as fast as the Shorthorns. Speaking generally, Welsh farms are small and the land not rich, but even in the favourable districts, as in the island of Anglesey, the agriculture is backward and undeveloped. It should be noted also that in Wales is found the lowest standard of wages for agricultural labourers that prevails: in Anglesey, as in Ireland, they fall as low as 10s. a week.

In many respects it is difficult to compare the farming of Ireland with that of the rest of Great Britain, so entirely different has been the system of land tenure. In Ireland the landlord has never carried out the improvements, but merely allowed his tenants the use of the land. The absence of any competing industries, to draw the sons of the farmers off the land, also resulted in continued subdivision, until the average size of the holding has become very small—28 acres, as compared with 63 acres in Great Britain. Having to such an extent made their farms, the tenants acquired, first by custom and then by law, a tenant-right in their improvements, which within the last few years has developed into a system of State-aided purchase, which will eventually make the tenants owners of their own farms. Owing to the comparatively

high rainfall, the indifferent drainage of the river valleys in the central plain, and the equable temperature, Ireland as a whole is a country more suited to the growth of grass than to corn, and over a large part of the country very little arable farming is to be found. 'By temperament also the Irishman seems to be rather a grazier than a farmer. In many districts, again, labour for arable farming, however cheap, is by no means plentiful; the rate of wages is extremely low—not more than 10s.-11s. a week, even in Ulster, within easy reach of the manufacturing towns. With this restriction of arable farming to the better lands, and the equable climate and rainfall, the yields per acre of corn and especially of roots in Ireland are comparatively high. The area under tillage, however, is only just beginning to show signs of increase, though it is difficult to see how holdings of the Irish size can be economically profitable, except under intensive arable cultivation.

North-
eastern
Ireland.

The most strongly-marked farming district in Ireland lies in the eastern side of Ulster and comprises County Down and other counties abutting on Lough Neagh. These are arable counties, except where the elevation is too great or the land too boggy; the land is mostly divided into small farms, not exceeding 50 acres, occupied by men of Scottish origin. Very fine farming is to be found in Ulster; particularly the crops of potatoes and roots are often very large. Little wheat is grown, but on the coast of County Down, especially in the Ards peninsula, barley becomes an important crop; everywhere else oats form the chief and almost only cereal, especially in the Bann valley towards Coleraine. Flax-growing forms an important feature in the Ulster farming; except on a small recently revived area in Cork, flax is now confined to Ulster, where the acreage undergoes rapid fluctuations from year to year according to the demand for fibre. Another characteristic crop of the district is grass seed. Cattle are extensively bred, there being a number of pedigree Shorthorn herds in the neighbourhood of Lough Neagh; but sheep are unimportant. This district has an

export trade in oats, potatoes, and hay with Glasgow and Liverpool.

Going southward the arable land does not extend much past Dundalk, but in the south of Louth, Meath, and northern Kildare passes into a great area of rich grass-land—a thin populated country given over to the summer grazing of bullocks and commanding for that purpose exceptional rents up to £3 an acre or more. These famous Meath grazings are largely let on terms of eleven months only, so as to prevent the occupier acquiring any tenant-right by a continuous tenancy. Below the central grazing district will be found a few areas of arable farming in south Kildare, Queen's County, Tipperary, and Kilkenny; similar areas occur in Wexford and again in Cork, though the farming in the centre and south of Ireland rarely reaches the general high pitch of Ulster. The Shannon counties, and particularly Limerick, form the great dairying district of Ireland, and here also are raised the store cattle which cross the Channel in such large numbers to be fattened by the English graziers. Lastly, on the western seaboard in Clare, Galway, Mayo, and Donegal come the congested districts, where an impoverished population wring a bare sustenance out of entirely inadequate patches of land that have been reclaimed from the mountain and bog. This area is now under the charge of the Congested Districts Board, which is making efforts to resettle the surplus population on larger acreages and better lands in other parts of Ireland.

[See *Journals of the Board of Agriculture and Fisheries* and the Royal Biblio-
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The output of agricultural products of the United Kingdom is considered
 on pp. 222 seqq., and further agricultural statistics will be found on
 pp. 564 seqq.]

CHAPTER VII.

ECONOMIC MINERALS

BY ALBERT GILLIGAN

History. THE south-western extremity of England has been known from very early times to yield tinstone or cassiterite, the oxide of tin, from which was obtained the metal tin, much valued by reason of its alloying with copper to form bronze, the substance used to make implements of all kinds before the general introduction of iron. The disputed name of the Cassiterides was given in allusion to the tin which was obtained here. The Phoenicians, who were the merchant adventurers of their time, and had established a base at Gades, now Cadiz; discovered the wealth of tin in these islands, and set up a trade in it with the Greeks. The Phoenicians bought the tin from the natives, who did not allow them to visit the mines, but carried the metal, cast in cubes and other forms, to a piece of land which at low water was joined to the mainland by a causeway, but at high water was an island, a description which suggests St. Michael's Mount, though Mr. Clement Reid identifies it with the Isle of Wight. Here the metal was bartered for salt, crockery, and brazen ware. It seems certain that Julius Caesar was led to the invasion of these islands by the value of the metal which he knew was obtained here, and traces of Roman engineering have been found in some old workings in Cornwall. In other parts of Britain, as Northumberland, Cumberland, Yorkshire, Derbyshire, Shropshire, Wales, &c., the Romans opened up mines for gold, lead, and copper, while in the border counties of England and Wales, quantities of refuse, made up of iron slag and cinders, in which Roman coins have been found, make it clear that they were keenly alive to the mineral wealth of the country which they had conquered. The methods

introduced by the Romans for working the ores would be classed as extremely wasteful by a modern metallurgist, but they held sway until recent times, and it has often been found worth working the waste heaps of former operations by modern methods of recovery.

Ores of some of the metals, such as tin, native gold, and platinum, are found in river gravels. These may be laid down along existing river beds or in deserted water-courses, which may since have been covered up by other deposits and so preserved. The stream tin* which was originally worked in Cornwall, but is now exhausted, was such a deposit, while the gold obtained in the British Isles has been derived from river deposits except at Dolgelly. Such minerals have been obtained from the country rock by disintegration, and concentrated by reason of a high specific gravity in the river gravels by a process of natural washing. More important than deposits of this kind, at least in the British Isles, are those found lying in beds interstratified with rocks of sedimentary origin and themselves no doubt deposited from aqueous solution. The ores most frequently occurring in this way are those of iron and manganese. Some of these bedded deposits of iron ore, such as that of the Cleveland district of Yorkshire, were originally limestones, but have had the calcium carbonate of which they were composed converted into iron carbonate by water containing some of the iron compounds percolating through the rock and causing the replacement of the calcium by the iron; the peculiar oolitic (i.e. egg-like) structures being perfectly retained. The ores of other metals, such as lead, copper, and zinc, are found in veins or lodes, which were doubtless either faults or joints in the rocks which have become filled with mineral matter. They are found cutting across the bedding at all angles, and varying in width from a few inches to several feet or even yards.

Proceeding to the study of the actual areas in the British Isles where minerals of economic importance are obtained, it can at once be said that they are almost

Occurrence of
ores.

Minerals
other
than iron
and coal.

entirely confined to the districts occupied by the Primary and Secondary rocks. If a line be drawn across England from the Humber to Lyme Regis it will be found that the older rocks, and therefore the mining districts, lie west and north of this line. The most important metalliferous mines (other than iron) are situated in Cornwall and Devon, Shropshire, Derbyshire, Yorkshire, Durham, Cumberland, and Westmorland. North Wales and Anglesey are also important centres, as well as the south-east of Ireland, the Isle of Man, and the south and west of Scotland. The iron and coal-mining industries will be dealt with later.

Cornwall. The chief places of the ore deposits in Cornwall are lodes which traverse both the granite and slate or killas, though usually having a tendency to dip towards the slate and partaking roughly of the nature of the enclosing rocks, felspar being abundant in all lodes passing through granites, but in the slate quartz is the predominating veinstone. In all lodes it is found that the most highly inclined are the most productive, and when the lodes cross each other they are richer at the junction than elsewhere. Occasionally it has been found that lodes which were originally worked for tin ore have at greater depths yielded copper ore, and at still greater depths tin ore again. The average direction or bearing of the lodes is 5° N. of E. and S. of W., a course very nearly parallel to that of the great bosses of granite between Dartmoor and Land's End. Every lode throws off side-shoots, and sometimes breaks up into an irregular network.

Division of Cornish mining districts. Robert Hunt grouped all the mining districts of Cornwall into four large divisions.

Western Division.

All those parts of the county west of a line drawn from Marazion to Hayle.

West Central Division.

That portion of Cornwall west of a line drawn from Dodman Point to Padstow and east of Marazion to Hayle.

East Central Division. West of a straight line drawn from Looe through Liskeard to the boundary of the county and east of the Padstow and Dodman line.

Eastern Division. Bounded on the west by the line from Looe through Liskeard to the boundary of the county and eastward to the River Tamar.

The more important mines in the western division are situated near the towns of St. Just and St. Ives. At St. Just the granite of Land's End carries only tin ore, but the associated slates have yielded large quantities of copper ores. In many cases the miners have followed the lodes beneath the sea as the dip of the lodes is in that direction, and at Botallack one diagonal shaft is 345 fathoms in length, for the most part beneath the sea. The sea can be heard as it beats against the cliffs, and the miners are provided with wooden wedges to plug any leak. In the St. Ives district, on the other side of the Land's End granite, the lodes are again exclusively of tin ore in the granite, while copper occurs in the slates. In this district is the St. Ives Consols mine in which was discovered the most remarkable deposit of tin ore ever found in Cornwall. It was an impregnation of tinstone in the granite, and the workings form enormous caverns 60 to 75 feet in height and of the same width. The mines in the west central division are chiefly for copper ore, though the granite has yielded tin ore. The Camborne district at present has the richest mines, the celebrated Dolcoath mine being situated here. This mine was originally worked for copper but now yields tin ore, the change being coincident with a change in the country rock from slate to granite. Numerous lead veins occur north of Truro, and the lead invariably carries silver. In the east central division lodes of haematite and spathose (iron carbonate) iron ores occur. The copper and tin lodes have been nearly worked out. It was here

Principal
mines.

that the best deposits of stream tin were found. It is important as being the only district in Britain where a mine is worked exclusively for uranium compounds. The mineral from which the uranium is obtained is called pitchblende in allusion to its pitch-like appearance. This is the mineral (though not obtained from Cornwall) from which Madame Curie separated radium, but the richest pitchblende contains only three grains of radium per ton. Other rare elements such as polonium and actinium have been obtained from pitchblende. The lodes in the eastern division carry tin and lead ores, and occur in the neighbourhood of the Bodmin Moor mass of granite, but the mines are being rapidly worked out.

Devon-
shire.

The most important mining district is that round Tavistock in which the Devon Great Consols copper-mines are to be found, formerly the most productive in Britain. Started in 1844 with a capital of £1,024 they yielded a profit of £1,000,000 during the next twenty-one years. The copper ores contain a considerable proportion of arsenic, and are roasted for this before being put on the market. The lead-mining industry of Devonshire dates back to the Roman occupation of the country, the chief districts being Beer Alston and Combe Martin, but recently the most productive mines have been those in the neighbourhood of the Tamar and Teign near Exeter. The amount of lead ore raised has rapidly declined of late years. At one time much tin ore was raised in Devonshire, but now the amount is almost negligible.

Somerset-
shire.

Attempts have been made from time to time to work the copper ores which occur in the Triassic rocks of West Somerset, but in some cases the cost of pumping was greater than the profits from the ore. The most important minerals in West Somerset are the iron ores of the Brendon Hills. The ore is the carbonate of iron called chalybite or siderite, and occurs as veins in the fault fissures of slaty rocks between Minehead and Watchet. These ores carry much manganese and so were peculiarly fitted for the making of spiegeleisen, used in the manufacture of steel. For this purpose they were

worked and exported to South Wales. In the Mendip Hills lead ore (galena) is found, and there is evidence that it was mined by the Romans. The old slags and slimes of these early smelters have been reworked in recent years and found to yield 12 to 14 per cent. of metallic lead. Calamine (carbonate of zinc) has been worked at Rowberrow, Shipham, and Harptree, and the calcined ore was sent to the brass-houses at Bristol and Birmingham.

The Forest of Dean in Gloucestershire is noteworthy as being one of the first seats of the iron trade in Great Britain, and the industry is mentioned in Domesday Book. The iron ore, which is a brown soft limonite, occurs in pockets or churns in the Carboniferous Limestone. Forest of Dean.

The lead ores of Derbyshire have been worked from early times, and latterly the ores of zinc have been extensively mined. The ores are found in veins in the Carboniferous Limestone, the richest being in the upper part, immediately below the Yoredale beds. The limestone is interbedded with masses of igneous rock called toadstone, a corruption of a German term, *Todtstein* (dead stone), indicating that the veins die out or become much impoverished in passing through this rock. The best deposits of the mineral fluorite or fluorspar are found in Derbyshire. It is used as a flux in metallurgical operations and for the production of hydrofluoric acid for etching glass. The name 'Blue John' is given to the purple crystalline variety of this mineral, and that found in the famous Blue John Mine near Castleton is used for ornamental purposes. The rich amethystine tint is obtained in spar of a brownish-purple colour by exposure to the heat of the sun or artificial heat. Roman vases of this variety have been found in Italy. Derbyshire.

Lead and zinc ores are found in veins in the rocks of Carboniferous age in Cumberland, Westmorland, Northumberland, Durham, and Yorkshire, principally in the Carboniferous Limestone and Millstone Grit. Alston Moor may be regarded as the centre of the district, and here the Carboniferous Limestone is about 1,000 feet thick, the Northern counties.

metalliferous veins being found in rocks above the Whin Sill, a name given to an intrusive sheet of igneous rock which runs across the country from Cross Fell to the Farne Islands. The veins in this district have usually been formed along lines of fault, the vertical displacement in some cases being as much as 300 feet. The principal workings are situated at the head-waters of the Tyne, Allen, Wear, Derwent, and Tees. The veins of the north of England may be grouped under three heads : (1) veins, (2) cross veins, (3) quarter-point veins. The first class, also called ' rake veins ' or ' right-running veins ', usually take an approximately east-and-west course, but varying in direction between N. 60° E. and S. 60° E. These veins are usually metalliferous, and are more productive in hard rock like limestone than in soft rock like shale. Cross veins running roughly north and south often displace the right-running veins, and have been found most productive of lead ore when in the Great Limestone, while in the strata beneath they frequently carry ores of copper as well as ores of lead. Veins having a direction intermediate between the first two are called quarter-point veins. These seldom contain lead ore, being usually filled with iron pyrites, copper pyrites, calcite, &c. Lead ore also occurs in ' flats ' or ' flots ', which may extend over considerable areas. The lead ores often carry as much as 12 ounces of silver per ton of lead, and were probably first worked for this metal. The zinc ore is now extensively worked, though formerly it was regarded as worthless and was used as a road metal. The lead-mining district of Yorkshire covers an area of about 700 square miles, and includes the high ground lying in the western parts of the rivers which drain the eastern slope of the Pennines from the Swale to the Aire ; here also the rocks belong to the Carboniferous formation. The lead ore occurs in rake veins, pipe veins, and flats ; the most important are the first named. The width of the veins varies considerably, being usually greater in the hard than in the soft rocks. These rake veins are generally fault veins. In the northern districts of Yorkshire the

veins are in the Carboniferous Limestone, and are more regular than those of the southern area which occur chiefly in the Millstone Grit. Again, in the northern area, the principal veins run from north of east to south of west, while in the south they run from north of west to south of east.

The Shelve mining district consists of rocks of Ordovician age which are fine-grained shales traversed by numerous dykes of igneous rocks. The lead veins have probably been worked from the time of the Romans, as pigs of lead bearing Roman inscriptions have been found. Shropshire.

Sandstone and conglomerate of Triassic age impregnated with copper carbonates have been worked at Alderley Edge and Mottram, but the undertaking has been long abandoned. The first preparation of vanadium in the elementary condition was accomplished by Roscoe from the cupriferous sandstone of Alderley Edge. Many stone hammers of Roman or pre-Roman date have been found at the Alderley mines. Cheshire.

In the neighbourhood of Aberystwith much galena, zinc-blende, and copper pyrites have been obtained. Wales. One group of veins were known as the 'Welsh Potosi' on account of the large amount of silver obtained from the lead, as much as 38 ounces per ton of lead having been recorded. Other groups of veins all rich in argentiferous lead ores can be traced as far as Llanidloes. These veins generally strike east-north-east and west-south-west, and have usually a dip to the south of 60 to 80°. The portions of the veins which are most productive are more continuous in a vertical than in a horizontal direction, and they have most frequently an inclination towards the west. The lead veins of this part of Wales show, as in the north of England, the peculiarity that when they pass from a harder to a softer rock the amount of mineral matter decreases. In Merionethshire gold has been obtained from veins which until 1843 had been worked for lead. These veins are found in an area about 25 square miles in extent lying north of a line from Dolgelly to Barmouth. The veins run east and west, vary much in width, and

are usually vertical. The associated vein minerals are quartz and calcite, and it seems that the only remunerative part of the vein is that which contains visible gold. The veins are found in rocks of Cambrian age. In 1843 the search for gold became more systematic in consequence of the discovery of gold at Cwm Eisen in a mine previously worked for lead. Extensive operations were later entered upon at Gwynfynydd, and in 1900 the yield of gold from the mines in the Dolgelly district was valued at £52,147, the gold being obtained from gold-bearing quartz. Manganese in the form of the carbonate is worked in Merionethshire and Carnarvonshire for the manufacture of spiegeleisen and ferro-manganese. In the mining area of Flintshire and Denbighshire are found remarkably rich deposits of galena, especially in the neighbourhood of Rhyl and Wrexham. Near Mold the white lead ore, cerussite, or carbonate of lead, has been worked. Towards the west of the district some of the veins are found to open out into large cavern-like excavations, which attest the fact that lead ore has been here obtained in large quantities.

Anglesey. The copper-mines of Anglesey were formerly so important that they controlled the European market. The percentage of copper was never more than 5 or 6, but there was hardly any limit to the amount. The veins are situated on the flanks of Parys Mountain near the town of Amlwch. Much copper has been, and still is, obtained by treating the water pumped from the copper-mines with scrap-iron, which precipitates the copper.

Isle of Man. The occurrence of metalliferous mines in the Isle of Man is similar to that in the Cornish peninsula, namely, near the junction of the intrusive granite masses with the slaty country rock. As examples the mines at Foxdale and Laxey may be mentioned. The main lode at Foxdale is remarkable for its great size, being sometimes 40 feet wide. The chief minerals mined are galena, which in some cases is highly argentiferous, and zinc blende. Copper ore and haematite also occur, but have not been worked on a large scale.

Records of the finding of gold in Fifeshire date back to Scotland. the twelfth century, though the finding of prehistoric gold ornaments in the country render it probable that the metal had been worked before the Christian Era. The principal place where it has been found in recent times is Sutherlandshire, where it occurs in the river-gravels of the Kildonan, Black Water (a tributary of the Brora), and other streams. Nowhere has it been found *in situ*, though it is highly probable that it comes from the quartz veins which are found in the valleys where the gold occurs. Valuable lead-mines occur, as at the Lead-hills in Lanarkshire, and Strontian in Argyllshire, while nickel has been worked near Inverary and at Craigmore.

Gold was certainly obtained from the river-gravels ^{Ireland} by the early inhabitants of Ireland, as ancient ornaments of gold have been found in peat bogs. Of late years gold has been discovered in the valley of the Dodder. A considerable amount of gold was obtained in the gold rush of 1793 to the district on the borders of Wicklow and Wexford, the cupidity of the miners having been aroused by the finding of a nugget weighing 21½ ounces in the bed of a tributary of the Oyoca. But, as in Scotland, no trace of gold has been found *in situ*, although government works were carried on with this object at the end of the eighteenth century. The alluvial gold of Wicklow was found associated with cassiterite and wolfram in the same way as it occurs in Cornwall. Platinum, which frequently occurs in alluvial deposits with gold, has been suspected by some observers. The minerals of Wicklow occur in a band or 'mineral channel', which encloses the lodes and stretches from Wicklow to Oyoca and then to the hill of Croghan-Kinsheela, a distance of fifteen miles.

Lodes yielding lead ores are found running through the Leinster granite in a north-and-south direction, but are little worked. Large deposits of barytes occur in King's Mountain, Connaught, while native sulphur, a very rare mineral in Britain, is found in small quantity in the Carboniferous Limestone of Oughterard. Copper and lead ores occur in many other parts of Ireland. The

iron ores of Antrim are the most important of the mineral products of Ireland at the present day. They occur associated with volcanic rocks between an upper and a lower group of basalts, and the ores have most probably resulted from the decomposition of the lower sheets of basalt. The ore has a peculiar structure and is known as pisolitic (*pisum*, a pea), or pebble iron ore, in allusion to the small rounded masses of limonite or haematite cemented together by clay. Bauxite (hydrated oxide of aluminium and iron) is found in Antrim, and after preparation is exported to Inverness-shire, where it is used in the production of aluminium.

Coal.

It is only during the last two hundred years that coal has been worked in Great Britain on a large scale. At first it was obtained by tunnelling into the hill-side, where an outcrop of coal was found, or by sinking shallow pits near the points where the coal came to the surface. The growing demand made it imperative to sink shafts to reach the coal at depths of over 2,000 feet in many cases, and in two instances of more than 1,100 yards. The workings have also been extended into districts far beyond the boundaries which were once supposed to mark the limits of some of the coal-fields. This has been the case in South Staffordshire, Yorkshire, and elsewhere, while in the south-east of England, near Dover, borings have proved the existence of coal which may have an important bearing on the future history of that part of the country.

The coal-bearing strata of the British Isles belong to the Carboniferous formation, but seams of coal (usually thin and of poor quality) are to be found in some other formations, especially the Oolite. There are different varieties of coal, such as lignite, cannel, bituminous, steam, and anthracite, differing in physical characters and chemical composition. Lignite is found in any quantity only at Bovey Tracey in Devonshire, and is of no economic importance.

Cannel coal is found in lenticular beds in many of the coal-fields, and is or has been much used for gas-making

purposes. Bituminous, or house coal, is the most abundant of all. Steam coal of the best quality in the world is found in South Wales. The term is used rather loosely, the percentage of carbon varying from 84 to 93 in the different so-called steam coals. The best anthracite is found in the western part of the South Wales coal-field. It is very hard, does not soil the fingers, and gives very little smoke in burning.

The coal-bearing strata, at the end of Carboniferous times, covered most of what is now Great Britain, and possibly Ireland, but a system of folds, produced by movements of the earth's crust, threw the strata into waves and troughs, one set of which had a general trend from north to south and another set from east to west. The crests of the waves have since been removed by denudation, leaving the coal preserved in a number of areas where the strata have the form of a basin. Some of these basins are almost perfect in shape, as in the Forest of Dean coal-field, while of others only the one-half is visible, the other half being concealed beneath a cover of newer rocks, as in the Yorkshire coal-field.

The coal-fields of Great Britain¹ may be divided between southern, midland, and northern provinces.

The southern province extends east and west across Britain from South Wales through the Forest of Dean and Gloucestershire and Somersetshire coal-fields, with possibly an extension under newer rocks to Dover. The most important of these coal-fields is that of South Wales, which is the second largest in the British Isles. It yields first-class steam coal, much valued for naval use, while in Pembrokeshire is found the best anthracite in the British Isles. The available quantity of steam coal has been recently estimated at 8,013,082,381 tons, and of anthracite 6,310,292,314 tons. The Forest of Dean may be regarded as a small detached portion of the South Wales coal-field. In the Somerset, Gloucester, and Kent coal-fields the coal-bearing strata are generally covered by

Distribu-
tion of
coal:
Southern
province.

¹ [E. Hull, *The Coal-fields of Great Britain*, London, 1905.]

newer rocks, but sinkings have been made through these to the Coal Measures beneath.

Midland
province.

The midland province includes a large number of coal-fields, namely, North and South Staffordshire, Warwickshire, Leicestershire, Denbighshire, Flintshire, Shrewsbury, Coalbrookdale, Forest of Wyre, Lancashire and Yorkshire,

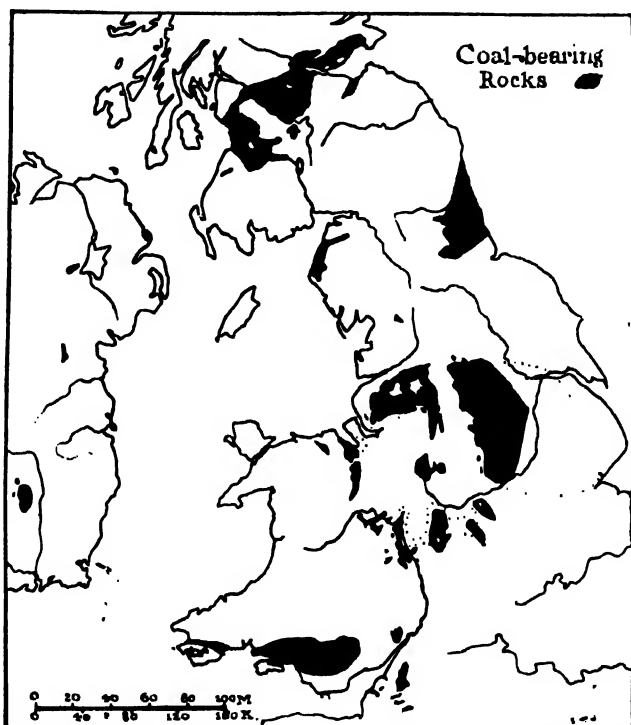


FIG. 45. Distribution of Coal in the British Isles. (Outside the area of this map lies the Kent coal-field.)

Nottinghamshire and Derbyshire. In many of these coal-fields the Coal Measures are concealed beneath a covering of newer rocks, and the full extent of the coal-field cannot be determined with certainty. This is notably the case in the Yorkshire coal-field, where a few years ago sinkings were confined to the western side of the Permian escarpment, but have now crept further and further east, and Professor P. F. Kendall reported to the Royal Com-

mission on Coal Supplies in 1905 that the unexplored coal-field of Yorkshire alone, which lay to the east, covered an area of about 3,000 square miles. Borings since put down have proved the Coal Measures as far east as Scunthorpe in Lincolnshire. The Pennine fold which separates the coal-fields of Lancashire from those of Yorkshire and Derbyshire, and has as a connecting-link the small Ingleton coal-field, continues northward to the Cheviots and separates the Northumberland and Durham coal-fields on the east from Cumberland on the west. These coal-fields constitute the northern province. In the districts already described, the workable coal occurs in the upper part of the Carboniferous formation, but in the coal-fields of the north the productive seams are found in the lower part of the formation corresponding to the Millstone Grit and Carboniferous Limestone of the southern coal-field. In the Northumberland and Durham coal-field the Coal Measures are considered workable to a distance of three miles under the bed of the North Sea. The eastern part of this coal-field is covered by newer rocks, as is the case in Yorkshire. The Cumberland coal-field has its strata dipping to the west and north-west, and the workable measures are continued beneath the newer rocks which occur round Carlisle as a centre, but the boundary of these northern coal-fields has not yet been proved.

Northern
province.

The Carboniferous formation in Scotland is now confined to the central lowlands stretching from the Firth of Clyde to the Firth of Forth. The area once covered was probably three times as large as that where such rocks are now found. As was noticed in the case of the coal-fields in the northern counties of England, the coals occur in the Limestone series at the base of the formation, as well as in the Coal Measures, one-quarter of the coal remaining to be won being in the Limestone series. The coals in the Limestone series are much better nearer the northern outcrop than when traced to the south. The principal coal-fields which are more or less isolated are as follows: Ayr, Lanark, Renfrew, Dumbarton, Stirling,

Scotland.

Linlithgow, Clackmannan, Midlothian, Fife, and Firth of Forth. Of these the most important is that of Lanarkshire, and here most of the coal comes from the Coal Measures.

Much coal is known to exist under the waters of the Firth of Forth, being a continuation of the Fife coal-field, but whether it is available or not is yet undecided. Anthracite occurs to a small extent in Arran and also in Lanarkshire. At Brora, in Sutherlandshire, is worked a seam of coal in rocks of Jurassic age. According to the Report of the Royal Commission in 1905 the amount of coal still occurring at workable depths in Scotland amounted to 15,681,456,356 tons.

Ireland. The most important formation found at the surface in Ireland is the Carboniferous Limestone, and this is overlain in a very few areas by Millstone Grit and Coal Measures. The coal-bearing rocks of northern Ireland are similar to those found in Scotland, while those in southern Ireland are similar to those of the southern portion of Britain. Over the whole of Ireland the amount of coal available is about 204,107,700 tons. The principal coal-fields in Ireland are as follows: Munster (East and West), Leinster, Connaught, Tyrone, and Ballycastle. The chief of these is the West Munster field.

Iron. Iron ores occur in rocks of very different ages, but at the present time the most important worked in Britain are found in the Carboniferous and Jurassic formations. The Carboniferous Limestone has long yielded both the red iron ore, haematite, and the brown iron ore, limonite. The haematite occurs in pockets, irregular in shape, in all parts of the limestone, from the bottom to the top, while the limonite occurs in veins often in association with ores of lead and zinc. The chief districts for these ores are the Forest of Dean, South Wales, Lancashire, Cumberland, and Northumberland. Before the introduction of the basic process of steel-making, haematite was of greater value than at present, because many of the ores now worked in Jurassic rocks contained too much phosphorus for that purpose.

The clay ironstones of the Coal Measures have con-

tributed in no small degree to the position which Britain has attained in the iron and steel industry. The coal-fields from which the most valuable ores of this class have been obtained are those of Staffordshire, Yorkshire, Shropshire, Derbyshire, South Wales, and Scotland. In Scotland the black band ironstone is noteworthy as containing sufficient carbonaceous material to enable it to be calcined without the addition of fuel. The Lower Lias at Frodingham in North Lincolnshire contains the well-known Frodingham ironstone. The bed is about 25 feet thick, but on account of a slight dip forms a large outcrop, and the working was formerly confined to this part, as the ore from a greater depth is less valuable. Recently, however, experiments have demonstrated that the unoxidized ore that was previously left in the ground can be economically calcined, and the field is being reworked for its extraction. Analyses show that the ore contains 25 to 30 per cent. of iron.

In the Cleveland district of Yorkshire is found the most important deposit of iron ore at present worked in Britain. It occurs in the Middle Lias, the structure of the ore being oolitic. The rapid growth of Middlesbrough during the last half-century testifies to the large scale upon which the ore has been worked and smelted. Where best developed the bed has a thickness of 12 to 15 feet, and is found over an area of about 350 square miles, but the most profitable part covers only about one-fifth of this. The percentage of iron in the ore as mined is about 28 to 30 per cent. Other somewhat important deposits in the Middle Lias occur near Caythorpe in Lincolnshire, Holwell in Leicestershire, Adderbury and Fawler in Oxfordshire. The Upper Lias contains no ironstone, but the Lower Oolite which comes next in ascending order has yielded iron ore in Yorkshire, Lincolnshire, Northamptonshire, and Rutland. The Northampton Sand has at its base ferruginous beds, and this ore has been worked at numerous places in the county of Northampton, as well as in the adjacent parts of Lincolnshire. There is evidence to show that the ore was worked in Roman times. The

Cretaceous rocks have yielded iron ore in the Weald and Claxby in North Lincolnshire, and the Weald was stripped of its timber by the early iron-workers, to be converted into charcoal for smelting purposes, concurrently with the felling of the oak trees for shipbuilding.

Other minerals. Of other materials which are of importance but have not been dealt with in the preceding pages the following may be mentioned :

Graphite. Graphite, which is almost pure carbon, is found in Cumberland in strings and irregular masses among rocks of igneous origin, which occur largely developed between Keswick and Ambleside.

Salt. Halite or rock salt is usually found in the British Isles in strata of Triassic age, and forms lenticular beds in the Keuper Marl. Where possible it is mined in the same way as coal, but usually it is pumped in the form of brine and the salt separated by evaporation. Much of the brine is used in the manufacture of alkalies. The great deposits of this mineral occur in Cheshire, Lancashire, Staffordshire, Worcestershire, Yorkshire, Durham, and Antrim.

Oil shale. Oil shale occurs as beds in the Calcareous Sandstone at the base of the Carboniferous rocks in Edinburghshire and Linlithgowshire, and yields on distillation 25 gallons of oil and 45 lb. of sulphate of ammonia per ton.

Wolfram. Wolfram is a mineral containing the somewhat rare element tungsten, and of late years it has been mined for that element, which is used in making special steels. Wolfram occurs usually with tinstone in Cornwall, and was at one time discarded as useless. Mines yielding wolfram have recently been opened in Cumberland near Carrock Fell.

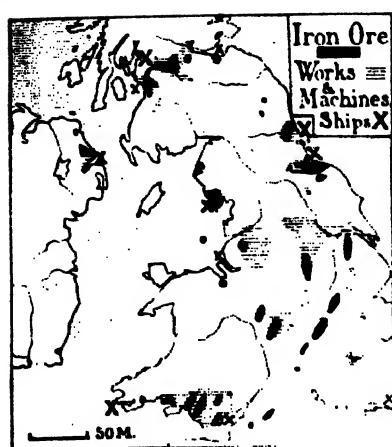


FIG. 46. Distribution of Iron ore, Iron-works, and Shipbuilding.



FIG. 47. Towns with over 50,000 Inhabitants.

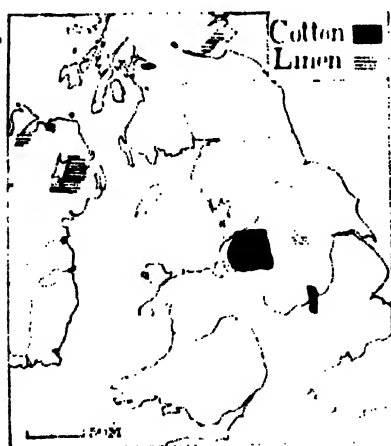


FIG. 48. Distribution of Cotton and Linen Manufactures.

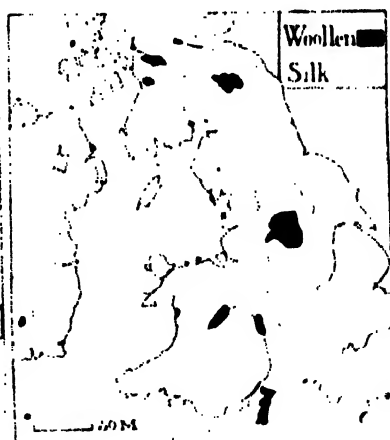


FIG. 49. Distribution of Woollen and Silk Manufactures.

CHAPTER VIII

THE PRODUCTION AND TRADE OF THE UNITED KINGDOM

BY PROFESSOR W. G. S. ADAMS

THE two questions of the production and the trade of the United Kingdom should be considered together. They are intimately connected one with the other, and in a considerable measure they depend on one another. Each separately may be a very important measure, but taken together they furnish the chief index of national economic activity. By production is here understood the total 'net output' of the industries of the United Kingdom; by trade, on the other hand, is meant the exchange in commodities which takes place between this country and all other countries.

The
Census of
Produc-
tion.

Now in the case of the United Kingdom, as with all other industrial and commercial states, the information is much more continuous and exact for external or foreign trade than for internal output and production. In the United States of America there has been since 1850 a fairly complete decennial census of manufacture, and since 1905 a quinquennial census. In the United Kingdom the Census of Production Act was passed in 1906, to be taken for the year 1907 (or where that was not possible, for twelve months ending June 1908), and for every fifth year thereafter. The final results of this industrial census were issued in 1912, and enable for the first time a comprehensive and fairly approximate estimate to be formed of the present annual production of the United Kingdom.

Data for
agricul-
ture, min-
ing, and
employ-
ment.

Previously to the Census of Production, however, materials were available for estimating certain sections of national production or output with, in some cases, considerable completeness. Thus, with regard to agriculture, since 1847 in Ireland, and 1867 in Great Britain,

an annual record has been taken of the area under crops, the estimated yield of the same, and the numbers of live stock; and on the data thus systematically collected it has at least been possible to make estimates of the annual production or output of agriculture. So also the Home Office has for many years issued an annual report on the mineral output of the United Kingdom and the number of persons employed in mines and quarries, while another return is published by the Board of Trade showing the annual output of iron and steel works. Again, in the case of the textile industries, the Home Office has at varying intervals published returns as to the number of spindles and machine power in the textile industries, which furnish some index as to the change in productive capacity of this very important branch of national industry. The Home Office also publishes annually statistics of the numbers employed in factories and workshops, and the Census of Population presents decennially a comprehensive return of the numbers employed in the various trades and industries. Furthermore, for many years the Board of Trade has collected statistics of the state of employment in the chief trades and industries. These main sources of information and other materials, official and non-official, have given at least some rough measure of change in certain important sections of the annual national production. But they offer only an imperfect comparison with the results of the comprehensive investigation now carried out by the Census of Production Office. It is thus possible for the first time to review with some assurance the total production of the United Kingdom, and to set this over against the external trade and exchange—a consideration of great interest and importance.

In the case of external trade, the statistical records of exports and imports enable not only the trade of the present to be estimated closely, but the growth and fluctuations of trade to be measured over a long succession of years, and the changes in the sources and destination of the trade to be compared and examined. The

Exports and imports : statistics in relation to production generally.

question, however, of how far imports and exports, of which there is thus a long record, can be taken as a general measure of national increase in production requires careful consideration. It is clear that the importance of a record of foreign trade as an index of change in national production varies greatly according to the countries concerned. In some countries foreign trade is very large relatively to total annual production, in other countries it is comparatively small. Thus, in the case of the United States of America and also of Germany, two countries pre-eminent in respect of high productive capacity per head of population, the amount of foreign trade per head of population is comparatively small. On the other hand, in Denmark, in Belgium, in Holland, and, as will be seen, in the United Kingdom, the records of imports and exports are a much more valuable index as to the state of production as well as of trade within these countries. At the same time, great care would be required even in such cases in deducing from the growth in foreign trade any corresponding expansion in internal production, and it is only where a searching analysis and a careful comparison of production and trade have been made, and where there is available also considerable subsidiary evidence, that conclusions drawn from such materials can be accepted with confidence. It may, however, be fairly claimed that in the case of the United Kingdom the detailed continuous records which are available with regard to imports and exports are of great value in attempting to gauge the state of production as well as of trade.

Import,
export,
and pro-
duction
values.

Before proceeding to consider the evidence with regard to the nature and extent of the trade and production of the United Kingdom, it is necessary, in order to prevent misconception, that it should be clearly defined what is included respectively in the values of (1) imports and exports, and (2) production. The definition of import and export values is simpler and more generally recognized than the meaning of the term 'production' or 'output'. Import values are the declared values of goods at the

port of landing, and include the charge for freight and insurance of goods. Export values are the value of goods 'free on board' at the exporting port, and do not include freight or insurance. However difficult it may be to ensure that declared values are made exactly in accordance with these definitions, the meaning of the terms 'import and export values' is generally accepted. But when we turn to the term 'output' or 'production', there is a much greater latitude and ambiguity of meaning. And for the purpose of clear conception and valid comparison it is necessary to define as precisely as is possible the sense and meaning which are attached, at least in this account, to the term 'production' or 'output'. In its widest sense the annual national output stated in terms of value would consist of the sum total value of not only all articles produced at the factory or workshop, but of the cost of the services of handling and retailing, &c. And furthermore, it might include all other services of any kind whatsoever for which remuneration is given. It might be even wider in conception, so as to include voluntary services. But as the immediate object of this comparison is to consider internal production in relation to imports and exports, a more limited and also a more exactly measurable meaning is attached to the word production. By production is here meant, as in the Census of Production tables, the value of the output of material goods at the place of their production—viz. at the farm, the mine, the workshop, and the factory. The value thus does not include, for the present comparison, the cost of transit and retailing. By this restriction in the sense of the term production a much more valid basis of comparison can be made respectively between the production of the United Kingdom and its imports and exports.

Turning to the evidence now available, it may serve the purpose of clearness, in dealing with a question involving much detail, to present in a brief summary certain broad comparisons and conclusions which can be subsequently analysed.

Net output of industries, excluding and including agriculture and fisheries.

First, with regard to production, the net output of industries, other than agriculture and fisheries, which came under the view of the census, amounted in 1907 to £712,135,000. This figure consists of (1) the value of raw materials, e.g. minerals raised in the United Kingdom, and (2) the value of labour spent in improving, manufacturing, or making up such raw material, or in so treating raw materials or partly manufactured goods which were imported. In addition to the above figures, the total output of agriculture in the United Kingdom is estimated by the census, on the basis of evidence furnished by the Agricultural Departments of Great Britain and Ireland, at £210,000,000, but the year taken in this case was that of 1908. From this sum, however, must be deducted an amount which in round figures may be estimated at £40,000,000, representing imported feeding-stuffs, manures, and material 'consumed' but not 'produced' by agriculture, and allowing also for a duplication in respect of imports of live stock from Ireland to England. The net output of agriculture is therefore estimated at £170,000,000. Similarly, the value of the fishery industry of the United Kingdom is, in round figures, placed at £12,000,000 in 1907. Thus so far the net output of the industry, agriculture, and fisheries of the United Kingdom amounts to, in round figures, a total of £894,000,000. This figure, however, is not complete. A number of producers, employers, and employees, to the extent of 1 to 1½ million, owing to particular circumstances, did not come within the review of the census, and it is estimated that the value of their output may be stated approximately at £50,000,000. There would thus result a total of, in round figures, £944,000,000. But owing to the nature of the inquiry and the methods adopted by the Census of Production, these figures, it is important to note, include (a) the value of the contracting and building trades, the net output of which is returned at little short of £43,000,000; and (b) the work spent on public utility services—gas, electricity, water, road-making, tramways

and light railways, public parks, &c.—amounting to a sum returned at £45,940,000. A very large part of such production is clearly not comparable with imports and exports, though to a certain extent companies and public authorities are manufacturers of commodities which enter into competition with other imported or exported goods. Hence it should be borne in mind that if a strict comparison is instituted between internal production and import and export trade, the total net annual value of internal production does not, so far as existing evidence goes, probably exceed £856,000,000. It must, however, be clearly understood that this estimated sum of, in round figures, £856,000,000, which is taken to represent the net output of industry, is something very much less than the total value of what is usually regarded as the product of home industry.

The term 'product of home industry' requires to be carefully defined. The industries of the United Kingdom are engaged in varying degrees in utilizing and manufacturing imported materials. To ascertain the net output of product of home industry, it is necessary to exclude strictly the value of both raw and manufactured materials imported for the purpose of manufacture. The net product which is here expressed in the estimate of £856,000,000 represents the combined value of (1) the raw material produced within the United Kingdom, including also what is harvested from the sea and landed in the United Kingdom by its fishermen; and (2) the value of labour expended on the working up of these and also of imported materials of manufacture. Thus the sum of £856,000,000 represents the value of the coal, corn, and other produce of the soil of the United Kingdom, including in that sum the labour expended in producing the coal or corn as well as the labour expended in working up these or imported materials for home consumption or export, but it does not include the value of imported materials used in the processes of manufacture.

Secondly, this being established, it is possible (1) to compare for the year 1907 the position of internal pro-

duction with the import and export trade, and (2) to consider what is the estimated value of the total output, including the value of imported materials of manufacture.

Imports
and ex-
ports :
total
values.

In the year 1907 the imports into the United Kingdom (less re-exports of foreign and colonial produce and exclusive of bullion and specie) amounted to £553,835,858, while the exports of the 'produce and manufactures of the United Kingdom' amounted to £426,035,083. The first point of striking importance is that the total import and export trade, excluding the re-export trade, amounted in 1907 to a sum of £979,900,941, which is thus greater than the net output of production of agriculture, industry, and manufacture—or, to bring the figures to a more strictly comparable basis, deducting 10 per cent. from the exports for cost of handling and transit to the ports, we have a total of £937,000,000. This fact bears out the very great importance of the sea-borne foreign and colonial trade of the United Kingdom. But while this comparison is of interest and value, what is much more important is (1) the relation of net imports into the United Kingdom to the total net output or production of the United Kingdom, and (2) the proportion between the exports of the 'produce and manufacture of the United Kingdom' and the total net output of the United Kingdom. With regard to the first of these points, it appears that imports stand to net production in the ratio of nearly 65 to 100, or if annual imports were paid for out of the net annual product of industry, 65 per cent. of this would be required to meet the cost of imports. As has been stated, however, the exports of the produce and manufacture of the United Kingdom amounted in 1907 to £426,000,000, and, deducting an allowance of 10 per cent. to represent the value at the factory, which rather than the port of shipment value is that comparable with the 'net output' value, we have approximately a sum of £383,000,000, or a value approaching 45 per cent. of the estimated national output exported. But it should be observed that the exports of so-called 'produce and manufactures of the United Kingdom' con-

Relation
between
imports
and pro-
duction.

sist to a considerable extent of imported raw or semi-manufactured materials, which are worked up or finished by British labour and then re-exported—a consideration which affects not only exports but also the question as to how far home production remains for home consumption. The ‘net output’ of British industry being taken at £856,000,000, if to this is added the value of imported material—raw and semi-manufactured goods—used in British and Irish industry, estimated at £377,000,000, to which must, however, be added the estimated cost of transport, &c., on imports from the ports to the factory, we get a total sum of £1,271,000,000 as an estimate of the value of the output at the places of production available for export or home consumption. Approximately £383,000,000, as valued at the mine or factory, are exported, and it would therefore seem that the home consumption of goods which are either in part or wholly of British produce and manufacture amounts to a figure which may be stated at £888,000,000. How much of this total value consists of imported material manufactured in the United Kingdom it is impossible to say. But it is clear that much the largest part of the output of the United Kingdom is for consumption in the United Kingdom.¹

These are striking relationships between home production and external trade which could not be previously realized. But the significance of these figures must largely depend on the character on the one hand of imports and exports, and on the other hand of internal production. We shall deal first with imports and exports, and consider how far they consist respectively of food-stuffs, raw materials, semi-manufactured goods, or finished articles.

¹ The figures of the total output of British production, as set out in p. iv and again in pp. 23 seq. of the *Final Report of the Census of Production*, are not comparable with import and export figures, and the above analysis is an endeavour to approach to a comparative statement on this very important subject.

[The figures quoted throughout this chapter may be supplemented from the statistical tables on pp. 566 seq., which usually furnish averages over the years 1907–11.]

The External Trade of the United Kingdom

Average
values for
production.

It has been seen from the foregoing that imports and exports represent a very important part of the trade of the United Kingdom, and there is an advantage in analysing these figures before we examine the estimates of production. The figures of production are for a period of twelve months only, namely, the year 1907, and in some cases, where 1907 figures were not available, for twelve months ending June 1908, and in the case of agriculture for the year 1908. Now it is well known that the figures of a single year may be considerably above or below average, and therefore it is very important to determine how far the year 1907 was an average year. The Census of Production collected a certain amount of information by way of comparison between 1907 and 1908, the preceding year, but this does not take us very far. When we turn, however, from figures of production to figures of trade, we have here a continuous comparable record from year to year, which enables the character of any census year to be ascertained so far at least as foreign trade is concerned, and as this trade, in the case of the United Kingdom, offers considerable evidence with regard to the state of production, we have a roughly approximate measure to hand, which indicates the average character of the census year as a year of production.

Condition
of trade
and production in
census
years.

The first condition, therefore, to a profitable consideration of the figures of trade and production is to see what was the state of trade in the year 1907, and how such figures compare with earlier and later years. Furthermore, as the year 1912 marks the second Census of Production (the returns of which will not be forthcoming for some time), and as the recorded figures of imports and exports of the United Kingdom for that period are available, we propose to compare the figures of trade in the year 1907 with those of 1912, and also with certain other preceding and intermediate years. It will offer the most concise method of indicating the proportion and significance of trade in these years if we present

two summary tables, the first showing the average annual value of imports and exports of the United Kingdom for each five years over a period of the twenty-five years ending 1912, and the second indicating the total of imports and exports in each year of the decade ending 1912. Taken together, these two comparisons will indicate the state of the external trade of the United Kingdom in the census years.

First, then, there is the table showing, by five-yearly periods for the twenty-five years ending with 1912, the total value of imports into the United Kingdom (excluding re-exports of foreign and colonial produce), and of exports of produce and manufacture of the United Kingdom.

<i>Average of :</i>	<i>Imports.</i> £1,000,000.	<i>Exports.</i> £1,000,000.
1888-92	355	244
1893-7	366	227
1898-1902	441	270
1903-7	503	345
1908-12	566	425

The second table shows the net imports and exports of the United Kingdom for each of the years 1903-12.

<i>Year.</i>	<i>Imports.</i> £1,000,000.	<i>Exports.</i> £1,000,000.
1903	473	291
1904	481	301
1905	487	330
1906	523	376
1907	554	428
1908	513	377
1909	533	376
1910	574	430
1911	577	454
1912	633	467
10 year average	535	383

These two tables taken together indicate clearly, first that the year 1907 was a year above the average of the years immediately preceding or subsequent to it, and considerably above the general average of the decade 1903-12, both as regards imports and exports, but that it was comparatively near to the average of the five years subsequent to 1907. The imports for 1907 were

£534,000,000, while the average for the five years 1908–12 was £566,000,000; the exports for 1907 were £426,000,000, and the average for the years 1908–12 was £425,000,000. The evidence gathered by the census authorities confirms this view as regards 1907, compared with 1906, that the year was from 5 to 15 per cent. higher, or, on a rough average, somewhere about 10 per cent. above the preceding year. What seems clear is that 1907, while a favourable year as regards trade, was a fair average of the five years subsequent to it, and was considerably less favourable than 1912, the second census year, which, so far as the figures of external trade indicate, was a year of especially flourishing trade and industry. The attention directed to this point will at least serve to guard against an unconditional acceptance of the year 1907 as a measure of British trade and production.

Growth of
British
external
trade.

At the same time, in connection with the above tables it must be noted how remarkable has been the growth of British external trade in the last decade. We know now approximately the relation in the census year 1907 of home production to foreign trade, and as the figures for successive census periods become available to follow the changes in this relation will be a matter of very great interest. It is not safe, however, to argue from the ratios which now exist between internal trade and production to the undetermined ratios in the past. Yet with the fragmentary but none the less important data which exist as regards certain branches of national production in the past, it will be possible for the statistical investigator to form an approximate series of estimates as to the output of British industry in past decades and the relations between external trade and internal production.

We shall now proceed to consider more closely the evidence as to the recent developments of British external trade, and in doing so to take particular note of the years 1907 and 1912. The figures for 1912, being those of the second Census of Production year, and furnishing also the latest complete analysis of external trade, have

a special interest, and it will therefore be our object to examine in greater detail the import and export figures of that year, and to compare them in their main features with those of the first Census of Production year, 1907.

Let us first note for these years the values of (1) total imports and exports; (2) the net total imports retained in the United Kingdom; and (3) the net export of the produce and manufacture of the United Kingdom, and the re-exports of colonial and foreign produce.

IMPORTS			
Year.	Total imports.	Net imports	
	£1,000,000.	(i. e. less re-exports).	£1,000,000.
1907	646	554	
1912	745	633	

EXPORTS			
Year.	United Kingdom Produce.	Foreign and Colonial Produce.	Total exports.
	£1,000,000.	£1,000,000.	£1,000,000
1907	426	92	518
1912	487	112	599

These figures show an increase in 1912 over 1907 of £79,000,000 in net imports, of £61,000,000 in exports of United Kingdom produce, and of £20,000,000 in exports of foreign and colonial produce.

The question with which we are here chiefly concerned is the analysis of the figures of net imports into the United Kingdom and of the export of the 'produce and manufactures' of the United Kingdom—it being always remembered, however, that this term, 'the produce and manufactures of the United Kingdom', includes imported raw and semi-manufactured foreign and colonial goods, which, after undergoing some stage of manufacture in the United Kingdom, are exported. But in passing it is well to note the great and increasing trade which the United Kingdom has as the chief entrepôt for distributing colonial and foreign produce to other countries. Of what, it may be asked, does this re-exported produce chiefly consist?

There are three main groups under which, in the official trade returns of the United Kingdom, imports and exports are classified, namely, (1) food-stuffs, drink, and tobacco;

Classification of imported and exported goods.

Re-exports.

(2) raw material and articles mainly unmanufactured; and (3) articles wholly or mainly manufactured. In 1912 the total value of foreign and colonial produce re-exported amounted in the first group to £15,000,000, in the second group to £67,000,000, and in the third group to £29,000,000. Thus nearly two-thirds of the total re-exported foreign and colonial produce consist of raw materials, among which the chief re-exports are cotton, amounting to £10,250,000, wool, £15,500,000, and rubber, £16,250,000 millions.

Trade
exclusive
of
re-ex-
ports.

Leaving aside the re-export trade, let us compare the imports into the United Kingdom for home use and consumption, and the corresponding exports of the produce and manufacture of the United Kingdom. The following statement presents a summary of the main divisions of these imports and exports in the years 1907 and 1912.

Imports for consumption in United Kingdom.

	1907. £1,000,000.	1912. £1,000,000.
1. Food, drink, and tobacco	235	266
2. Raw material and articles mainly manu- factured	189	208
3. Articles wholly or mainly manufactured (in- cluding unclassified articles)	130	159
Total	554	633

Exports of produce or manufacture of the United Kingdom.

	1907. £1,000,000.	1912. £1,000,000.
1. Food, drink, and tobacco	22	33
2. Raw material and articles mainly unmanu- factured	56	59
3. Articles wholly or mainly manufactured (in- cluding unclassified articles)	348	395
Total	426	487

Foreign
and
colonial
trade.

The predominating characteristic of the trade of the United Kingdom, as shown by the above summary, is the very large imports of food-stuffs and raw materials, and the very large exports of articles mainly or wholly manufactured. But this is more clearly realized when a somewhat more detailed analysis is made than the above summary can afford. Especially is it important

to analyse, both as regards imports and exports, the third group in the Board of Trade classification, namely, articles wholly or mainly manufactured.

Before we examine the main classes of imports and exports, it will be of interest to see broadly distinguished the extent to which imports and exports into the United Kingdom are respectively from and to (1) foreign countries, and (2) British dominions. Owing to the fact that in the statement of re-exports the values of colonial and foreign produce are not distinguished one from the other, it is only possible to show the gross imports, including re-exports of (1) foreign and (2) colonial produce into the United Kingdom. But these figures indicate broadly the proportion of imports respectively from foreign and colonial sources. With regard to imports this is shown in the following summary :

	1907. £1,000,000.	1912. £1,000,000.
1. Food, drink, and tobacco: from foreign countries	186	200
Food, drink, and tobacco: from British Dominions	62	80
Total from foreign and colonial	248	280
2. Raw materials: from foreign countries	170	193
Raw materials: from British Dominions	72	83
Total from foreign and colonial	242	276
3. Articles mainly or wholly manufactured: from foreign countries	135	166
Articles mainly or wholly manufactured: from British Dominions	21	23
Total from foreign and colonial	156	189
Total imports from foreign countries	491	559
Total imports from British Dominions	155	186
Total	646	745

In round figures, approximately one-fourth part of the gross imports into the United Kingdom consist of produce from the British dominions, the remaining three-fourths coming from foreign states. It will be noted also that the proportion of colonial produce imported is higher in the case of food-stuffs and raw materials, and that it is considerably lower as regards articles mainly

manufactured. When we turn to the figures of exports of the produce and manufacture of the United Kingdom we get the following summary :

	1907. £1,000,000.	1912. £1,000,000.
1. Food, drink, and tobacco: exported to foreign countries	13	20
Food, drink, and tobacco: exported to British Dominions	9	13
Total	22	33
2. Raw materials, &c.: exported to foreign countries	52	56
Raw materials, &c.: exported to British Dominions	3	4
Total	55	60
3. Articles wholly or mainly manufactured: exported to foreign countries	222	234
Articles wholly or mainly manufactured: exported to British Dominions	126	161
Total	348	395
Total exports to foreign countries	287	310
Total exports to British Dominions	138	178
Total	425	488

Position
of export
trade with
British
domi-
nions.

These summary figures are of great interest because they show that approximately one-third of the exports of British produce and manufacture goes to the British dominions, and that the proportion so disposed of is increasing. Exports alike to foreign countries and to British possessions have increased greatly in recent years, but the increase has been more marked in the case of exports to British possessions. What is still more noteworthy is the fact that the exports to British possessions consist almost entirely of goods mainly or wholly manufactured, for the exports of food- and drink-stuffs are also mainly manufactured articles, and the distinction of this group from articles 'wholly or mainly manufactured' is merely a matter of convenience in classification for the purpose of distinguishing (chiefly in the case of imports) the very important group of food- and drink-stuffs. Having briefly noted the broad division and relative importance of the import and export trade of the United Kingdom with foreign countries and the British dominions

respectively, an examination may now be made of the three main groups of imports and exports.

First, with regard to food, drink, and tobacco, the following statement shows the net imports returned for consumption in the United Kingdom, distinguishing the main groups :

	1907. £1,000,000.	1912. £1,000,000
Grain, flour, &c.	74	87
Meat, game, poultry, &c.	51	48
Eggs, butter, cheese, milk, &c.	37	41
Other food- and drink-stuffs	69	83
Tobacco	4	6
Total	235	265

With regard to the above figures we may note for the year 1912, as indicating recent detailed figures, some of the items of greatest consequence. Thus, in the case of the imports of grain, flour, &c., which represent close on 35 per cent. of the total food imports, no less than £45,000,000 out of the £87,000,000 represented imports of wheat, while in addition there was a net import of wheat flour amounting to close on £5,500,000. The total import of wheat and wheat flour and meal thus exceeded £51,500,000, of which amount wheat and flour to the value of close on £28,000,000 came from the British Empire. The other chief imports in this class consisted in 1912 of barley to the value of close on £8,000,000 ; oats, £6,000,000 ; maize, £13,000,000. It is of interest to note that while the imports of wheat have risen with comparative steadiness from a value of £27,000,000 in 1902 to over £46,000,000 in 1912, the imports of flour have fallen in the same period from £9,000,000 to £5,500,000.

The second group, viz. the imports of meat and animals for food, is only second in importance to that of grain imports. But within recent years there has been no such upward movement in meat as in grain imports. Imports of live stock slaughtered at the ports have steadily declined, and the great supplies of meat which come into the United Kingdom are now almost wholly chilled

and frozen beef and mutton drawn from a wide range of countries. In 1912 the imports of beef amounted to a total value exceeding £13,500,000 ; mutton, £9,500,000 ; and bacon, hams, and pork, £18,000,000. The chief sources of supply are, in the case of beef, the United States and the Argentine ; of mutton, Australia, New Zealand, and the Argentine ; while the largest supplies of bacon, hams, and pork come from Denmark, the United States, and Canada. During the decade under review the imports of meat have remained comparatively stationary, and there is evidence that home-grown beef, mutton, and pork are maintaining their position in the home market.

Dairy
produce.

In the third group also, viz. the imports of dairy produce, changes in quantity within recent years have been comparatively restricted, though values tend gradually to rise. The chief import in this class is that of butter, which, out of a total value of imported dairy produce amounting to £41,000,000, accounts in 1912 for a value of over £24,500,000 ; eggs, £8,000,000, cheese rather over £7,000,000, and condensed milk over £2,000,000. The imports of fresh milk are small, the United Kingdom being practically dependent on home supplies. The chief sources of dairy produce imported into the United Kingdom are, butter from Denmark, Russia, Australia, and New Zealand ; eggs from Russia and Denmark ; while supplies of cheese are drawn chiefly from Canada, New Zealand, and the Netherlands.

Miscel-
laneous
food-
stuffs.

These three groups, namely, cereals, meat supplies, and dairy produce, are the food imports which are of greatest interest from the point of view of comparison with home produce. In the large miscellaneous group of other food- and drink-stuffs, the chief imports in 1912 were : vegetables, fruits, and preserves. £20,000,000 ; sugar, &c., £26,500,000 ; tea, £10,500,000 ; wine, £8,000,000. Such are the main features in the imports of food- and drink-stuffs, &c., which represent over 41 per cent. of the ^{net} imports of the United Kingdom. Let us consider the corresponding exports.

The exports of food- and drink-stuffs and tobacco from **Exports.** the United Kingdom form a very small part of the total exports—in 1912 less than 7 per cent., namely, £33,000,000 out of £487,000,000. But small as is this group of exports, it has shown a very steady increase in recent years, having doubled in the past decade from £16,000,000 in 1903 to over £32,500,000 in 1912. The characteristic of this group is that it consists chiefly of manufactured food- and drink-stuffs. The total exports of grain and flour, amounting to over £4,238,880 in 1912, consisted chiefly of milled produce. The exports of meat products, amounting only to £1,103,582, were mainly bacon, hams, and preserved meats. The export of dairy produce is insignificant. Thus, so far as the three groups of grain, meat, and dairy produce are concerned, the exports are very small. The chief exports in the group of food- and drink-stuffs from the United Kingdom are fish, of which over £6,700,000, mainly salted and cured, was exported in 1912; spirits, £4,241,000; beer and ale, £2,158,000; while there is also a considerable and growing export of biscuits, confectionery, and condensed milk. Thus, as a whole, it may be said that most of the food and drink exports from the United Kingdom are manufactured goods—and, as will be seen later from the Census of Production, food and drink manufacturing undertakings form a considerable group among the industries to-day in the United Kingdom. Food and feeding stuffs thus form the largest group of imports in the United Kingdom, but a comparatively small proportion of exports.

The next group which has to be considered, namely, **Raw materials and articles mainly manufactured.** raw material, consists of very large imports, and with the exception of one commodity—coal—very limited exports. The following statement shows (1) the total imports, including re-exports; (2) re-exports of foreign and colonial raw materials; (3) the net imports for use in the United Kingdom; and (4) the exports of the raw produce of the United Kingdom.

**IMPORTS AND EXPORTS OF RAW MATERIALS AND ARTICLES MAINLY
UNMANUFACTURED IN 1912**

	(1) <i>Total imports.</i>	(2) <i>Re-exports of colonial and foreign pro- duce.</i>	(3) <i>Net imports.</i>	(4) <i>Export of raw produce of the United Kingdom.</i>
	£	£	£	£
Coal, coke, &c.	276,516	10	276,506	42,584,454
Iron ore, scrap iron	6,219,050	10,459	6,208,591	409,335
Other metallic ores	9,059,505	640,738	8,418,767	115,068
Wood and timber	28,357,158	774,099	27,583,059	323,958
Cotton	80,238,960	9,580,104	70,658,856	—
Wool	36,567,818	14,401,283	22,166,535	4,817,642
Other textile materials	18,378,100	4,600,390	13,777,710	475,058
Oil seeds, crude oils, nuts, fats, &c.	37,418,767	5,321,467	32,097,300	4,568,304
Hides and undressed skins	13,690,265	8,019,030	5,671,235	2,027,826
Paper-making materials	55,566,996	241,669	5,325,327	927,668
Rubber	21,580,331	16,287,335	5,292,996	—
Miscellaneous	18,114,100	4,617,241	13,496,859	3,167,940
Total	325,467,566	64,493,825	210,973,741	59,417,453

This table is full of interest, and most important. The total imports of the United Kingdom being in 1912 £745,000,000, it will be observed that the total imports of raw material represented rather more than one-third of this value. But in this connexion it will be noted that the re-exports of colonial and foreign raw materials are very large. Of the total re-export trade of the United Kingdom, amounting to £112,000,000 in 1912, more than one-half consists of raw materials, while of the total imports of raw materials some 24·4 per cent. are re-exported. Over 13 per cent. of the raw cotton imported is re-exported; 40 per cent. of the wool; 27 per cent. of flax, hemp, and jute; 15 per cent. of fats and oils; no less than 60 per cent. of skins and hides; and 75 per cent. of the rubber.

Principal
items
among
imported
and ex-
ported
raw
material.

When we consider (1) the net imports of raw material, and (2) the exports of United Kingdom raw material, which are the figures of greatest significance in this connexion, the first fact which stands out is that the imports of textile raw materials alone amount to a sum exceeding £105,000,000, or half the total value of imported

raw material, and that the groups of imports which are next in importance are those of (1) oil seeds, oils, fats, &c., and (2) wood and timber. The imports of iron ore and other metallic ores are smaller than is generally supposed, and amount to roughly 7 per cent. of the imports of raw materials. On the other hand, in the case of exports of the raw produce of the United Kingdom, the outstanding feature is the very large export of coal, which accounts for over two-thirds of the total value of exported raw material.

Such being the outstanding features in the trade in raw materials, it is important to see from what countries the chief raw materials were drawn, and in the case of the re-exports, to what countries they were redistributed.

The greater part of the iron ore imported comes from Spain—in 1912, some 64 per cent., though this is a lower percentage than usual. Wood and timber come mainly from Russia, Norway and Sweden, the United States and Canada, Russia being the heaviest exporter. Raw cotton has at present two chief sources of supply, the United States and Egypt, and of the total import of £80,238,960 in 1912, no less than £55,232,346, or nearly 69 per cent., came from the United States, and £20,760,943, or nearly 26 per cent., from Egypt. From British India and British East and West Africa, &c., the export to the United Kingdom amounted to £2,003,842, or approximately 2·5 per cent. of the total imports. As may be seen from the above table, there is a re-export of raw cotton amounting to £10,587,150 in 1912, chiefly to the United States, £4,665,442, and to Russia, £3,068,073. Carrying cotton to the United States may seem like carrying coal to Newcastle—but it is Egyptian cotton which finds its way to the United States, via Great Britain. The total imports of wool, including camel's hair, mohair, and waste, &c., amounted to £36,567,818. Of this amount, sheep and lambs' wool was of the value of £33,235,015, the chief imports being from Australia, £12,589,003; New Zealand, £7,701,364; British South Africa, £4,544,663; British India, £1,590,900; the Argentine Republic, £2,208,681; and France, £1,852,916. Of

Sources of
imported
raw
material.

the total of sheep and lambs' wool, 80 per cent. comes from countries within the British Empire—a striking contrast to the position of the supply of raw cotton. Of the total import of mohair, £1,709,487, British South Africa supplied £1,030,338. In the case of wool, the re-exports are very large—amounting, as was pointed out, to 40 per cent. of the total imports. Of £14,346,535 sheep and lambs' wool re-exported, £4,387,056 went to Germany, £3,199,196 to France, and £2,695,555 to Belgium, while to the United States of America there was an export of £3,485,648. The imports of silk raw material amounted in 1912 to £1,446,560, to which total China alone contributed £899,914. Of the total imports of flax, hemp, and jute, £17,131,542—the import of flax (including tow or codilla) amounted to £4,892,744, of which amount £3,193,901 came from Russia, and £1,523,679 from Belgium; the imports of hemp (including tow or codilla) amounted to £3,801,694—the largest imports being from the Philippine Islands (£1,990,481)—re-exports amounting to £1,309,291; while the import of jute amounted to £8,342,171, nearly the whole of which, viz. £8,285,163, came from British India, of which £3,072,747 was re-exported. The imports and exports of hides and skins are collected from a great variety of countries, chiefly the Argentine, Australia, and New Zealand, while a considerable part of the export of this raw material, home and foreign, finds its way to the United States of America. The large and miscellaneous group of oil-seeds and fats, and mineral oils, amounting to £37,418,767, includes cotton seed, £4,800,116, chiefly from Egypt and India; flax seed, £4,366,219, mainly from the Argentine and India; animal and vegetable oils of a value of over £8,000,000; and other oils, chiefly petroleum, of a value exceeding £7,000,000; while imports of tallow, &c., chiefly from the Argentine, Australia, and New Zealand, exceeded £3,500,000.

Articles
wholly or
mainly
manufac-
tured.

The third main division of the external trade of the United Kingdom consists of what are classed in the official returns as 'articles wholly or mainly manu-

factured'. Now, in considering this very large class, which forms 25 per cent. of the imports, and nearly 80 per cent. of the exports of the United Kingdom, it must be borne in mind that a very considerable part of these imports, and to a less extent of exports, consists of semi-manufactured goods. It would be a great advantage if in the official tables of imports and exports there were adopted a differentiated classification which would distinguish the semi-manufactured from the finished articles. But it is fair to recognize that the question is one of considerable difficulty from the point of view of a useful classification. The important question, looked at from a national point of view, is to estimate how far the imports and exports respectively consist of goods of a high and how far of a low grade of manufacture. The term 'finished article' itself is a very general phrase which may include such widely different classes of goods as scientific instruments, cardboard boxes, and bricks; while on the other hand, semi-manufactured goods in many cases are articles in a high state of manufacture, e.g. machine parts or textile piece goods which will go through a further process of treatment before becoming a finished product. In the final report of the Census of Production an attempt is made to distinguish between semi-manufactured goods and finished articles, or goods in their final stage. For the year 1907 the census authorities, without showing details of their classification, give a total figure of £110,100,000 as representing semi-manufactured goods imported, and £50,300,000 as representing goods imported as finished articles ready for consumption; while in the case of exports of the produce of the United Kingdom, semi-manufactured goods account for £220,700,000, and goods in their final stage, £176,000,000. These figures exclude manufactured goods of the class of food, drink, and tobacco, but include in the case of exports the gold and silver refined in the United Kingdom.

For the sake of clearness and emphasis we may divide the imports and exports of goods 'mainly or wholly

Metal,
textile,
and other

manufactured goods. manufactured ' into three groups : (1) metal industries ; (2) textiles ; (3) all other industries—a broad classification which will also be maintained in considering the production of the United Kingdom.

IMPORTS AND EXPORTS. GOODS MAINLY OR WHOLLY MANUFACTURED IN 1912.

<i>Description.</i>	<i>Net imports (excluding re- exports).</i>	<i>Exports of United Kingdom produce.</i>	<i>Re-exports of colonial and foreign pro- duce.</i>
	£	£	£
1. Metal industries.			
Iron and steel	12,684,145	48,597,677	277,846
Other metals and manufactures thereof	22,535,233	12,284,471	8,662,195
Cutlery, hardware, implements, and instruments	5,368,792	8,108,878	1,022,537
Electrical goods	1,231,866	4,341,587	225,777
Machinery	5,549,315	33,158,015	1,271,368
Motors, cycles, and railway carriages	7,035,499	9,758,210	815,844
Ships	32,835	7,027,162	819
Total metals	54,437,685	123,276,000	12,876,386
2. Textiles and apparel.			
Cotton goods	9,255,189	122,219,939	2,256,433
Woollens	8,845,818	37,773,504	1,266,513
Silk	12,422,646	2,225,739	1,933,834
Linens	2,646,179	9,685,881	87,646
Jute yarn and manufacture	1,442,334	3,535,372	1,504,308
Apparel and haberdashery, &c.	6,711,639	12,874,783	1,470,160
Total textiles	41,323,805	188,315,218	8,518,894
3. Other manufactures.			
Leather goods (including boots and shoes)	13,070,673	9,451,396	2,341,591
Paper	7,049,906	3,559,317	184,531
Manufactures of wood and timber	2,557,416	2,058,818	316,412
Earthenware and glass	4,119,803	4,973,374	159,477
Chemicals: drugs and dyes, &c.	11,013,937	21,036,390	1,531,821
Miscellaneous	22,704,390	32,357,802	3,260,307
Total	60,516,125	73,437,097	7,794,139
Gross total	156,277,615	385,028,315	29,189,419

Relative position of classes of manufactured goods in imports and exports. From the above table it will be noticed that whereas imports of manufactured goods are fairly well distributed between the three classes—metal industries, textiles, and the miscellaneous group of other industries—in the case of exports, the textile and metal industries represent four-fifths of the total. It should be added that a more

exact analysis than is here possible would show that a greater proportion of the imports of manufactured goods consists of articles in a less final state of production than is the case with the exports. In short, just as the imports of raw material greatly exceed the exports, so do semi-manufactured articles rather than finished goods predominate among imports more strongly than among exports.

1. Thus in the case of the first main division, viz. the metal industries, the largest group among exports and the second largest group among imports is that of 'iron and steel and manufactures thereof', consisting of articles such as plates and sheets, bars and angles, girders, tubes and pipes, wheels and axles, wire rods, nails, screws, bolts, nuts, &c. This whole section of the trade forms a large part both of the total imports and exports respectively. But if a comparison is made of the detailed returns as furnished by the 'Annual Statement of Trade of the United Kingdom' it will be seen that even within this group the imports tend to less manufactured articles than is the case with the exports. This is still more evident in the imports and exports of the 'other metals and manufactures thereof'. It will be noted from the table that in this case the imports are almost double the exports. But examination of the detailed tables in the Annual Statement shows that the imports consist mainly of unwrought brass, copper, lead, tin and zinc, &c., in other words, the materials of further manufacture, while the exports consist to a larger extent of more highly manufactured goods.

Most of the other entries under the metal industries explain themselves. Among the imports of cutlery, hardware implements, instruments, &c., the most important import is that of scientific instruments, exceeding £3,000,000 in 1912, but there are considerable imports also of watches, clocks, and parts thereof, of implements, tools, and hardware goods. In recent years exports in this group have been increasing more rapidly than imports, having risen from £4,384,672 in 1902 to £8,108,878

in 1912. So also there has been a more rapid advance in the exports of electrical goods than in the corresponding imports, exports having increased from £2,486,649 in 1903 (from which year the classification of these articles is comparable) to £4,341,587 in 1912. Much more important are the imports and exports of machinery. Imports for use in the United Kingdom have increased from £4,110,000 in 1902 to £5,549,000 in 1912, while exports of machinery manufactured in the United Kingdom have risen from £18,754,815 in 1902 to £33,158,015 in 1912. The chief exports in this group consist of textile machinery, but all classes are well represented, including agricultural machinery, steam engines, locomotives, winding and pumping machinery, sewing machines and electrical machinery. There has been also a very marked increase in recent years alike in the imports and exports of motors, cycles, carriages, &c., imports having risen from £1,289,000 in 1902 to £7,035,000 in 1912, an increase almost entirely due to the trade in motor cars and parts thereof, while exports of British manufacture in this class have risen from £3,600,000 to £9,758,000.

The export of ships consists mainly of steam vessels and ships' machinery, and it is interesting to note that the year 1907, the first census year, reached an export amounting to a value of £10,000,000 as compared with an export of £7,000,000 in 1912. Thus, regarding the metal industries as a whole, it will be noted that, with certain exceptions, the chief imports consist of iron, steel, and other metal goods of comparatively simple manufacture which are required for the purpose of further manufacture in the United Kingdom, whereas in the case of exports, a much larger proportion consists of highly manufactured or 'finished goods'. It is further true to say that the exports of highly manufactured or finished articles in the metal industries have been increasing at a more rapid rate than imports.

Textiles :
cotton.

2. The second group which has to be noted is that of the textile trades. Here the ratio of imports to exports is even lower than in the class of metal goods—exports

being $4\frac{1}{2}$ times as great as imports. Indeed, in 1912 the export of cotton goods alone was about three times the value of the total imports of textiles and apparel.

True, the net imports of cotton goods have been steadily rising from £5,168,448 in 1902 to £9,255,189 in 1912, chiefly consisting of piece goods, cotton hosiery and lace, but, on the other hand, exports of cotton manufactures have risen from £72,458,100 in 1902 to £122,219,939 in 1912, the exports of cotton yarn rising from £7,404,083 to £16,222,150, and of piece-goods from £55,215,344 in 1902 to £91,624,257 in 1912, while exports of other cotton goods such as hosiery, lace, thread, &c., have remained much more stationary, rising from £9,838,673 in 1902 to £12,983,621 in 1912. The main side of the cotton industry is thus the piece-goods industry, which accounts for three-fourths of the total cotton export.

Second only to the cotton industry among the textiles is the woollen industry. The imports of woollen manufactures are nearly as large in value as those of cotton, but so far from there being an increase in imports, the trade statistics show that their value is considerably lower than ten years ago, the net woollen imports in 1902 amounting to £12,101,169, and in 1912 to £8,845,818. There is a considerable import of woollen and worsted yarns, exceeding a value of £3,000,000 in 1912, but the chief articles of import are woollen stuffs and flannels. The exports of woollen goods, on the other hand, have been steadily rising from £22,658,228 in 1902 to £37,773,504, but of this amount, over £11,500,000 consist of 'tops' and of woollen, worsted, and other yarns, the remainder being woollen and worsted woven materials, hosiery, &c. There is thus a very large and growing export trade in woollens, whereas imports have been declining.

The imports of silk goods consist almost wholly of silk broad-stuffs, ribbons, and other finished goods. It is worthy of note that the imports have remained nearly stationary during the decade; the net imports in 1902 amounting to £13,205,447, and in 1912 to £12,422,646.

The exports of silk goods consist chiefly of certain classes of broad-stuffs and silk goods mixed with other materials, and though there are considerable fluctuations from year to year, the value of the exports in the decade has shown a slight increase.

Linen. Much more important from the point of view not only of export trade, but of total production, is the linen industry. The net imports of linen yarn and linen manufactures in 1902 amounted to £1,594,923, and in 1912 to £2,646,179; while the corresponding exports of the manufactures of the United Kingdom amounted to £6,272,137 in 1902, and in 1912 to £9,685,881. The export consists chiefly of piece goods, but it should be remembered in considering both these and similar figures in the cotton, woollen, and silk trades, that they understate the exports of these materials, inasmuch as other articles of linen, woollen and cotton, and silk materials are exported under 'haberdashery' and 'apparel'. It is thus worthy of note that alike in all the three main textile industries, cottons, woollens, and linens, exports show a fairly strong and comparatively steady upward tendency. This is also true of the exports of the jute and hemp goods, which, however, furnish a much smaller item in the export trade.

Apparel, &c. Finally, in connexion with this group there must be noted the important class of imports and exports which are summarized under 'apparel' and 'haberdashery'. The figures as given in this present statement do not follow the classification of the Board of Trade, which, under apparel, includes boots and shoes—articles which in the foregoing table are included under leather goods. The imports of haberdashery, &c., have increased from £4,032,580 in 1903 to £6,711,639 in 1912, while the exports have risen from £9,458,062 in 1902 to £12,874,783 in 1912.

Manufactures other than metal and textiles. 3. With regard to the third group in the above table, namely 'other manufactures' than those of the metal and textile groups, it may be said that here also, especially as regards imports, a large part of the goods consists of

semi-manufactured articles. In some respects the most striking of the imports in this group is the value annually imported of leather goods, including boots and shoes. Between two-thirds and three-fourths, however, of the total value of the imports of leather goods consist of dressed and undressed leather, which may be properly regarded as a semi-manufactured import. In 1912 the value of dressed and undressed leather imported was £9,247,170, while the imports of boots and shoes amounted to £800,919, and of leather gloves to £1,389,039. It is of particular interest to note that both the imports of boots and shoes and of gloves show no increase in recent years, and the evidence both of the figures of exports and of production show that home industry here as in many other fields is maintaining its ground against the foreign article. Turning to the exports of the produce of the United Kingdom in 1912, dressed and undressed leather amounted to £1,153,311, while leather boots and shoes were valued at £3,974,915, which figure may be compared with the export of 1902, amounting to £1,876,604, an index of the great development which has taken place in the last decade in the boot and shoe industry of the United Kingdom. There is also a large export from the United Kingdom of saddlery, harness, machinery belting, gloves, and other leather manufactures.

A brief reference must suffice with regard to the other main articles of manufacture and trade. In the case of paper, the imports chiefly consist of common paper for packing, wrapping, printing, or writing, amounting in 1912 to £4,688,959, the other large items of this group consisting of strawboard and millboard and like material. The exports, which are little more than half the total value of the imports, consist chiefly of printing paper and stationery. The imports and exports of manufactures of wood are alike comparatively small, the imports consisting chiefly of cabinet and joiner's work, and of woodware and turnery, while the chief exports consist of furniture and cabinet wares. The chemical imports and exports furnish a very large and miscellaneous

group, including drugs, dyes, paints, colours, of which a great part consists of what may be regarded as the materials of manufacture and production. It is interesting to note that the exports in this group include a large annual value of chemical manures, amounting in 1912 to close on £5,290,000, while other articles, such as pitch, sulphate of copper, painters' colours and materials are important items.

Having thus taken a broad survey of the main features of the British external trade, and having noted the outstanding changes in that trade, it remains to consider the evidence which has been obtained as regards the output of the United Kingdom in the year 1907.

Production of the United Kingdom

Relative
importance of
industries.

The first question to be considered is the relative importance of the different trades and industries in the United Kingdom as shown by the Census of Production statistics. The following table presents in summary the results as stated in the final report of the Census of Production.

<i>Group of trades.</i>	<i>Gross output. Selling value, or value of work done.</i>	<i>Materials used. Cost.</i>	<i>Work given out. Amount paid to other firms.</i>	<i>Net output. Excess of column (1) over columns (2) and (3).</i>
	(1)	(2)	(3)	(4)
	£	£	£	£
Mines and quarries . . .	148,026,000	28,495,000		119,531,000
Iron and steel, engineering and shipbuilding trades . .	375,196,000	212,224,000	9,890,000	153,082,000
Metal trades, other than iron and steel	93,465,000	81,341,000	231,000	11,893,000
Textile trades	333,561,000	235,038,000	4,189,000	94,334,000
Clothing trades	107,983,000	58,185,000	2,125,000	47,673,000
Food, drink, and tobacco trades	287,446,000	197,734,000	198,000	89,514,000
Chemical and allied trades . .	75,032,000	53,466,000	9,000	21,557,000
Paper, printing, stationery, and allied trades	61,308,000	26,611,000	1,047,000	33,650,000
Leather, canvas, and india- rubber trades	34,928,000	26,229,000	81,000	8,618,000
Timber trades	40,390,000	24,780,000	166,000	21,444,000
Clay, stone, building and con- tracting trades	116,692,000	49,679,000	6,557,000	60,456,000
Miscellaneous trades	8,288,000	3,778,000	67,000	4,443,000
Public utility services	77,051,000	30,786,000	325,000	45,940,000
Total	1,765,366,000	1,028,346,000	24,885,000	712,135,000

This table is so important as the summary of the results of the Census of Production (excluding agriculture, fisheries, and the output of certain other classes referred to elsewhere) that it deserves the most careful consideration. The meaning to be attached to the several columns in the above table must first of all be noted. The gross output (column 1), as also the gross value of raw material in column 2, involves a large amount of duplication. Thus, for example, in the cotton trade yarn is usually spun by one firm and sold to another, which weaves it into cloth, and the value of the material is returned twice—first as yarn, then as cloth. This and other like duplications throughout affect both columns 1 and 2. Again, firms may work on commission. The firm doing the work on commission makes a return of its production to the census, while the firm giving out the work and probably completing the manufacture of the article, returns the total value of the article. The value of such work given out is shown in column 3. It is therefore the 'net' output (column 4) which alone can be regarded as the value created by production in the United Kingdom. But it is important to get quite clear what is and what is not included in column 4. It represents the result of subtracting columns 2 and 3 from column 1, and indicates the net value of the capital, labour, and raw material of the United Kingdom expended in the work of production (excluding agriculture, fisheries, &c.). As a total it includes the value of the labour expended, and it also includes the value of the material, e.g. coal, iron, and stone, the produce of the United Kingdom used in the work of production. It represents thus the fund out of which labour and capital find their remuneration. But further it must be noted that it represents only the value at the place of production—the mine or the factory—and that it does not include the costs and profits of marketing and retailing the produce and whatever labour and capital may derive from this source. Again, it does not include the value of imported material, which as has been seen from the figures

of imports, is used to a very great extent in the industries of the United Kingdom. The sum of £712,000,000 does not represent, therefore, what is usually regarded as the output of British and Irish industry, namely, the value of the goods finally produced in this country for direct consumption or for export. For the output of British industry so understood includes raw and semi-manufactured materials which are worked up in this country, whereas the net output of British labour and capital represents simply the native materials and the values added by labour and capital to native or imported materials.

Considerations
affecting
census
returns.

But the above table is not complete in two respects. It does not include (1) the output of British and Irish agriculture and fisheries, or (2) the output of miscellaneous classes of workers who were not reached by the census returns, and the value of whose contributions to national production is estimated by the census authorities at £50,000,000. Further, it must be noted that the above table includes certain important items which from their nature are not comparable with the figures of imports and exports. Thus it includes the value of work done in the building and contracting trades, and also the value of work expended in what are called public utility services—such as water, lighting, transport, and other public enterprises. What would be desirable is a strict classification made by the census authorities, so that as exact a comparison as is possible might be made between imports and exports on the one hand, and internal production on the other. But it is at present only possible to indicate in a broadly approximate way the relations in national economy between these two great factors of external trade and internal production. The final report of the Census of Production is an indispensable work to the student of British industry and trade, and great credit is due to the way in which a very complex and difficult task has been carried through, but its usefulness will be increased if in future times the relations between internal production and external trade are more definitely and completely examined.

Let us, however, from the materials available proceed to see the total production on a basis as far as possible comparable with imports and exports. The following summary shows for a period of twelve months (usually for the year 1907) the net value of the output of the industries of the United Kingdom—including agriculture and fisheries.

1. Net output of agriculture, 1908 :	£1,000,000.
Great Britain	131
Ireland	39
Total net agricultural output for the U. K.	170
2. Estimated output of the fishery of U.K.	12
3. Net output of industries reviewed by the Census of Production (excluding the contracting trades, public utilities, &c., £88,000,000)	624
Census estimate of unreviewed trades	50
Total	856

So far as existing data permit an approximate estimate, the above figure may be compared with the figures of imports and exports. It is now desirable to restate this summary in somewhat greater detail, in order to bring out the main factors which go to make up the total of the agricultural and industrial outputs, and to see the relative importance of different branches of industries in the existing scheme of national output. The following table sets out the several main branches of industry, classified under four main groups, with the total number of persons employed in each branch of industry.

Trade or industry.	Net output. £1,000,000.	Number employed (excluding out-workers). Men and women.
1. Agriculture, &c.	170	2,324,000
Fisheries	12	107,423
Food, drink, and tobacco	90	403,701
2. Mines and quarries	120	965,230
Iron, steel, and metal trades, engineering and shipbuilding	153	1,539,415
Metal trades other than iron and steel	12	114,473
3. Textile trades	94	1,253,044
Clothing trades	48	756,466
4. Leather, canvas, and india-rubber	9	84,724
Paper, printing, &c.	34	325,475
Chemical, &c., trades	22	127,842
Timber trade	21	239,195
Clay and stone	17	205,614
Miscellaneous	4	46,874
Unenumerated	50	1,125,000
Total	856	9,678,476

This summary table brings out in a striking way (1) the important position which agriculture still holds in national production, and (2) the magnitude of the output of (*a*) the iron and steel trades, and (*b*) the textile industries, while at the same time it brings into relief the importance of the other main groups of industries and trades.

Thus with a general summary of industry in view, the several groups may be more particularly examined, considering each industry at the same time in the light of imports and exports. We shall follow the division of the subject into four sections: (1) agriculture and fisheries, (2) the mining, &c., and metal industries, (3) the textile industries, and (4) other industries.

Agriculture : its economic position.

The first industry to be considered is that of agriculture. It remains the greatest industry as regards the annual value of its output, and also it is that which employs more of the population than any other branch of production. It contributes largely to the food-supply and to the raw materials of industry, though the main work of British agriculture is to supply food and feeding-stuffs and the materials of the food and drink industries. Yet, as is well known, the United Kingdom has become, with its increasing population, steadily more dependent on imported food-stuffs, as also on imported raw material. The production of agriculture has not kept pace with industrial production, and there are respects in which agriculture is the most unorganized and backward of British industries. Moreover, there are features in British agriculture which are disquieting. The shrinkage of the area of tillage, and the decline in the labouring population are symptoms of an unsatisfactory state of affairs, while in many parts the low wages of labour, the under-capitalized condition of a great deal of the farming, and the slowness to adopt the methods of combination and co-operation which have revolutionized European agricultural economy in the past generation, and are being adopted in the old East and the new West, are all matters of no little concern for the economic welfare of the United Kingdom to-day.

The matter for immediate consideration, however, is ^{Present} the nature of the present output of agriculture. ^{Dis-} ^{agricul-} ^{tural out-} ^{put.} Distinguishing for the present the output of Great Britain and Ireland, the total output of agriculture in Great Britain is estimated by the Board of Agriculture and Fisheries in London to have amounted in the year 1908 to £150,000,000. This sum does not include the value of the home agricultural produce consumed by farmers' households, or the product of allotments and holdings of a single acre and under. In the Census of Production Final Report, a sum of £20,000,000 is allowed to cover the value of such produce, raising thus the agricultural output of Great Britain to a total of £170,000,000. As, however, there is a large import both of feeding-stuffs and fertilizers, which, going either to the factory or directly to the farm, must amount to a sum which may be estimated at £33,000,000, the net output of the agriculture of Great Britain may be stated as approximately £137,000,000. In the case of Ireland, the output of agriculture, eliminating duplication, is estimated at £45,000,000, and allowing for manures and imported feeding-stuffs, the net output may be placed at approximately £39,000,000. Further, it is estimated that live-stock, &c., to the value of about £7,000,000 is imported from Ireland to England, so that eliminating this duplication, it would appear that the net output of agriculture in the United Kingdom was approximately in 1908 £170,000,000.

In examining in greater detail the agricultural production of the United Kingdom, we may usefully distinguish the following main classes of produce: (1) crops, (2) live stock and meat production, (3) dairy produce and eggs.

With regard to crops, a very large part of the annual ^{Crops.} production in the United Kingdom consists of feeding-stuffs for stock on the farm, the value of which is to be found in the output of live stock and live-stock produce. It is of interest, however, to note that by the official returns the total gross produce of crops in Great Britain and Ireland was estimated in 1908 at £125,000,000 for Great Britain, and £30,566,000 for Ireland. The figure

for Great Britain is calculated at market prices, which in the case of fodder crops, such as turnips and mangolds, are too high as average farm production prices. A total of £140,000,000 rather than £155,000,000 is a fairer estimate of the value of the crop produce of the United Kingdom. But of this large total it may be estimated that approximately produce to the value of £60,000,000 is sold off the farm or consumed by farmers' families. In Great Britain the crops sold represent, according to the official estimate, £46,600,000, to which has to be added the consumption of farmers' households and the produce of cottagers and others not included in the return. The total for Great Britain cannot be far short of £55,000,000. In Ireland the value of crops sold or consumed by farmers' households is estimated at £5,565,000. Thus it may be conjectured that, taking the United Kingdom as a whole, about £60,000,000 represents the value of crops sold off the farm or consumed by the farmers' household. The remainder goes to feed live stock and to provide seed, &c., for future crops. The following table shows the total output of the chief crops in which home production has to compete with imported supplies :

		<i>United Kingdom, 1908.</i>	
		<i>Production.</i>	<i>Imported.</i>
		£	£
Wheat (and flour)	. . .	10,664,000	44,483,113
Oats (and meal)	. . .	18,140,000	4,563,124
Barley	10,218,000	6,110,592
Potatoes	5,948,000	1,967,216

The tendency of farming in the United Kingdom has been to a shrinkage in grain crops, which seems, however, to be checked in recent years, a shrinkage also, but less marked, in green crops, and an increase in hay and pasture. The following table brings out the changes as indicated by the acreage under the several crops—the best measure in such cases :

	<i>Wheat.</i>	<i>Oats.</i>	<i>Barley.</i>	<i>Potatoes.</i>	<i>Turnips and Mangolds.</i>
1877	3,321,065	4,238,957	2,652,300	1,392,784	2,826,814
1887	2,388,477	4,418,300	2,255,268	1,367,301	2,685,727
1897	1,939,311	4,225,882	2,213,547	1,193,645	2,560,217
1902	1,772,840	4,157,079	2,083,014	1,214,575	2,424,610
1908	1,664,860	4,189,378	1,824,410	1,161,122	2,338,737
1912	1,971,801	4,096,111	1,816,426	1,219,583	2,363,974

The second group is that of live stock and meat-pro-^{Live}duction. While the area of corn and green crops has ^{stock.} fallen, and the quantity of crops directly marketed has largely decreased, live-stock rearing has unquestionably made great advances, not only in respect of numbers, but also as regards breed and quality. When statements are made about the decline of British agriculture, it should be borne in mind that the live-stock industry of the United Kingdom has advanced to and maintained the premier position in the world, and that great progress has been made even within recent times in the process of selecting and building up the chief breeds and strains of cattle. The growth in numbers of live stock may be seen from the following table :

	<i>Horses.</i> <i>No.</i>	<i>Cows and</i> <i>Heifers.</i> <i>No.</i>	<i>Other</i> <i>Cattle.</i> <i>No.</i>	<i>Total</i> <i>Cattle.</i> <i>No.</i>	<i>Sheep.</i> <i>No.</i>	<i>Pigs.</i> <i>No.</i>
1877	1,894,128	3,744,647	5,986,890	9,731,537	32,220,067	3,984,447
1887	1,937,041	3,948,407	6,091,548	10,639,055	29,401,159	3,720,928
1897	2,069,880	3,984,616	7,020,357	11,004,073	30,567,380	3,683,043
1902	2,022,961	4,084,341	7,292,645	11,376,986	30,056,756	3,639,782
1908	2,088,713	4,368,305	7,370,427	11,738,792	31,332,400	4,055,793
1912	1,994,607	4,400,816	7,513,819	11,914,635	28,967,440	3,992,549

From this table it will be observed that while horses, sheep, and pigs have been on the whole comparatively stationary in number, cattle, both dairy cows and other cattle, show a marked increase.

First of all, before cattle and meat are considered, notice must be taken of horses. The following statement shows the value of the output for the year 1908 as estimated by the Agricultural Departments of Great Britain and Ireland :

	<i>Output in 1908.</i> <i>No.</i>	<i>Value.</i> <i>£</i>
Great Britain	53,000	1,590,000
Ireland .	34,000	1,464,000
Total	87,000	3,054,000

The exports of horses were valued at £1,170,855 and the net imports at £301,268, but imports and exports in the case of horses are deceptive as they include, for example, race-horses which are being moved from one country

to another. Of much greater importance are the cattle, sheep, and pig industries. The agriculture of the United Kingdom has been passing more and more into a live-stock industry, and, as will be seen, the proportion of the meat supplies of the United Kingdom which are home produced is still very large. The following statement shows the estimated output in 1908 of cattle, sheep, and pigs :

	<i>Cattle.</i>		<i>Sheep.</i>		<i>Pigs.</i>	
	<i>No.</i>	<i>£ value.</i>	<i>No.</i>	<i>£ value.</i>	<i>No.</i>	<i>£ value.</i>
Great Britain	2,130,000	27,264,000	9,577,000	18,196,000	4,419,000	14,362,000
Ireland	1,159,000	14,041,000	1,273,000	2,206,000	1,731,000	5,868,000
United Kingdom	3,289,000	41,305,000	10,850,000	20,402,000	6,150,000	20,230,000

These figures are of very great interest and we may compare them with the live-stock and dead-meat imports in 1908 :

	<i>Home output.</i>		<i>Imports.</i>
	<i>£</i>		<i>£</i>
Cattle	41,305,000		18,195,825
Sheep	20,402,000		8,417,973
Pigs	20,230,000		19,225,534
Unclassified	—		1,870,669
Total	81,937,000		47,710,001

These figures explain themselves. They can, indeed, only be regarded as an approximate comparison, but they indicate that over 60 per cent. of the United Kingdom consumption of meat was home-grown. It is interesting to note that much the heaviest imports relatively to home production are of pig-meat, bacon, hams, &c., in which imports are approximately equal to home production. In this connexion also the value of poultry, &c., may be noted. It is not possible to make more than an approximate estimate of the total value of the annual output of poultry, but it appears to be not less than £2,250,000. It is thus evident that the output of meat, beef, mutton, pig-meat, and poultry approximates £84,000,000 or £85,000,000, and it may be said that this figure represents a fair average of annual production.

Dairy
produce.

With regard to the third group, that of dairy produce, we have to note the home production and imports of

milk, butter, and cheese. One of the developments which has been most marked in British agriculture is the increasing attention given to the milk supply. Over 95 per cent. of the home consumption is supplied from within the United Kingdom, and as the demand increases with a growing population, a larger part of agricultural production is directed to meet this demand. In 1908 the value of milk and cream produced for consumption as such in Great Britain was estimated at £25,553,000, while that of Ireland was estimated at £3,947,000, giving a total for the United Kingdom of £29,500,000. The net imports, consisting chiefly of condensed milk and milk powder, amounted to £1,544,872, while the export of condensed milk in 1908 amounted to £756,568. Much smaller is the home production of butter. Butter produced for sale in Great Britain was returned at £2,940,000, but the production, allowing for supplies made for private consumption, is probably nearer £6,000,000, while the Irish total output is estimated at £6,704,000, and the total production of butter in the United Kingdom may be estimated to approach a value of £13,000,000. Net imports, on the other hand, amounted to £23,775,183, so that the home supplies represent about 35 per cent. of the total home consumption. The production of cheese for sale in Great Britain is returned at £1,400,000, and allowing for supplies made not for sale and also for the small Irish output the total value of cheese produced probably does not exceed £1,500,000. In 1905 the net imports of cheese amounted to £6,503,334. Thus summarizing this important group of dairy produce, we get the following statement for the United Kingdom output and for imports respectively :

	<i>Home production.</i>	<i>Imports.</i>
	£	£
Milk	29,500,000	1,640,000
Butter	13,000,000	24,081,000
Cheese	1,500,000	6,684,000
Total	44,000,000	32,405,000

To this total must be added the value of the eggs produced in the United Kingdom. Approximately this may

be estimated at an annual value of £10,000,000, a sum which is almost certainly under rather than over the mark, when allowance is made for the considerable unenumerated sources of supply in the official British returns. The value of eggs imported in 1908 was £7,183,000.

Wool,
fruits,
timber.

Apart from the above main classes of agricultural produce, the output of certain other imported commodities may be noted, viz. wool, fruits, &c., and timber. The home production of wool in 1908 was estimated in the official returns at in round figures £3,000,000, or if the value of skin wool is included, £3,500,000, a sum which is probably under than over the actual total value. The net imports of sheep and lambs' wool are very great, amounting in 1908 to £15,104,487. The value of home-grown fruit is estimated approximately at £5,000,000, but this figure is almost certainly below the mark. The corresponding imports of fruit—excluding semi-tropical and tropical fruits—amounted to between £4,000,000 and £5,000,000. The output of timber in the United Kingdom was estimated at approximately £930,000, whereas the net imports of wood and timber were returned at £23,687,745.

Summary. We can thus draw together a summary of the production of British agriculture and the corresponding imports :

	<i>Home production.</i> £1,000,000.	<i>Net imports.</i> £1,000,000.
Crops (marketed)	55	64
Horses	3	—
Live stock and meat output	85	48
Dairy produce and eggs	54	40
Wool	3	15
Fruit	5	5
Total	205	172

In the above statement adequate allowance has not been made for small unenumerated supplies in home production, and if to this is also added the value of home-grown timber — approximately £1,000,000 — the total value of the agricultural output of the United Kingdom may be assumed to be approximately £210,000,000, the figures accepted by the Census of Production. But

it must always be remembered that from these figures must be deducted the value of artificial manures and imported feeding stuffs, which are estimated for the United Kingdom at £40,000,000, thus leaving a net output of agriculture which may be stated as approximately £170,000,000.

In connexion with the output of home agriculture and the imports of food and feeding stuffs may be considered the food, drink, and tobacco manufacturing trades in the Census of Production. This is a considerable and an expanding branch of British and Irish industry, as was seen when considering the exports from the United Kingdom of food- and drink-stuffs. The following table indicates briefly the variety of these trades and the value of the output of each group:

	Value.	
	£	£
Food, drink, and tobacco products:		
Grain-mill products	64,567,000	to 65,327,000
Bakery products	38,775,000	
Cocoa products	3,105,000	
Fruit and confectionery products	13,002,000	
Bacon products	10,000,000	to 10,250,000
Preserved meat products	3,022,000	
Pickles, sauces, baking powder, and cognate products	2,710,000	
Milk and margarine products	9,958,000	
Fish-curing products	3,722,000	
Farinaceous products and offals	2,145,000	
Animal food products	1,800,000	
Ice	398,000	
Sugar and glucose products	11,000,000	to 12,000,000
Brewing and malting products	60,512,000	
Distillery products	4,776,000	
Spirit compounding and methylating products	4,014,000	
Bottling products	13,312,000	
Mineral waters and other drinks	5,671,000	to 5,811,000
Tobacco products	23,795,000	

Total—food, drink, and tobacco products 276,443,000 to 278,593,000

Adding to this total the value of oil-cakes, £6,700,000, and of infant and invalid foods, £626,000, the aggregate gross value of the food, drink, and tobacco trades amounts to a sum lying between £283,769,000 and £285,919,000. But there is a certain amount of duplication between group and group, especially in the case of the grain-milling and the bakery trades. Eliminating such duplication, but including the value of flour and spirits used for

Manufactures connected with food, drink, and tobacco.

Gross and net values of food, drink, and tobacco trades.

industrial purposes, the Census of Production estimates the value of the output in the United Kingdom of human and animal food, of drink, and of tobacco, at between £252,750,000 and £255,000,000. This figure, however, includes duties on beer, sugar, molasses, and glucose amounting to £15,291,000, and also duties on tobacco estimated at £12,666,560. It must also be remembered that the output of these industries includes a large value of raw material imported or home grown. The 'net output', representing the value added by the labour and capital expended in manufacturing, is returned in the Census of Production at £89,500,000, a figure based, however, on returns for the year 1907. Food, drink, and tobacco manufactures exported from the United Kingdom were returned at £20,096,000 free on board, while the net imports of similar goods were of the value of £67,380,000 at the port of landing.

Correlation of food imports, agricultural output, and food industries.

From the above statement we may now relate to one another three things, (1) the imports of food- and drink-stuffs; (2) the output of the agriculture of the United Kingdom; and (3) the value of work done in the food- and drink-manufacturing industries of the United Kingdom. In the year 1908, (1) the net imports of food- and drink-stuffs and tobacco into the United Kingdom amounted to £233,000,000; (2) the value of food and materials for food and drink manufactures produced in the United Kingdom (allowing £27,000,000 for (a) agricultural produce of the United Kingdom for purposes other than food and feeding stuffs, and (b) imported feeding stuffs) gives approximately a sum of £183,000,000; while (3) the value of work done, including returns on capital, expenditure, profits, &c., in food and drink manufacture, i.e. the net output of the Census of Production, is returned at £89,500,000. Thus these figures give a total of £506,000,000. Deducting exports of United Kingdom produce stuffs, there is left a net value of £484,000,000 as representing the value at the farm, factory, or port of landing, exclusive of duty, of food, drink, and tobacco consumed in the United Kingdom.

The second division of the production of the United Kingdom which has to be considered is that of the output of mines and quarries and of the iron and steel industries. This group is divided into three sections in the Census of Production, namely, (1) mines and quarries; (2) the iron and steel industries and the engineering and ship-building trades; and (3) the metal trades other than iron and steel. It will be convenient to follow this classification in making a general survey of the output of the mining and of the iron and steel and other metal industries.

First, with regard to mines and quarries, the following statement shows the value of the output of the leading products of this group.

Coal	110,554
Foundry coke (excluding gas coke), by-products, &c.	11,037
Manufactured fuel	1,205
Oil shale, shale oil, &c.	2,647
Ironstone	4,315
Tin, lead, and other minerals	1,409
Salt	605
Slate	1,146
Limestone and lime	2,074
Chalk, stone, and other products	4,636
Other manufactured products	146
Total	148,864,000

There is a certain amount of duplication in the above returns, e.g. coal used in the production of coke. As a result, it is estimated that after eliminating duplication the value of the output of this group of trades is about £134,000,000. So far as can be distinguished, the value of the exports in 1907 in this group was £43,900,000 free on board, and the value of the net imports was £20,700,000. The total number of persons employed in this group, as returned by the Census of Production, was 965,230, of whom 958,909 were males, 64,341 being under 16 years of age. No branch of industry shows anything like so large a proportion of men as compared with boys and women employed. It will be seen from the above table that the outstanding feature is the very large annual output of coal and the relatively small production of other minerals.

Coal.

The coal industry is of such magnitude and of such fundamental importance to the United Kingdom that some further reference, however brief, must be made to the output and disposal of this great source of national wealth. The following table shows the output of the different classes of coal in 1907 and the quantities thereof (1) exported; (2) shipped for use in steamers in foreign trade; and (3) retained in the United Kingdom:

	<i>Quantity raised. Tons.</i>	<i>Quantity exported. Tons.</i>	<i>Quantity shipped for the use of steamers en- gaged in the foreign trade. Tons.</i>	<i>Quantity retained in the United Kingdom. Tons.</i>
Anthracite . . .	3,909,000	2,128,000	—	1,781,000
Steam . . .	128,204,000	46,730,000	18,619,000	62,855,000
Gas . . .	29,039,000	10,445,000	—	18,594,000
Household . . .	53,060,000	1,510,000	—	51,550,000
Other sorts, includ- ing coal not separ- ately distinguished	52,348,000	2,788,000	—	49,560,000
Total	266,560,000	63,601,000	18,619,000	184,340,000

Thus of the total output roughly 24 per cent. was exported and 7 per cent. used in foreign trade. The output of coal rose in 20 years from 162,000,000 tons in 1887 to 267,000,000 tons in 1907. Meanwhile the price of coal has also risen considerably, the value of the total output in 1887 being returned at £39,000,000 and the value in 1907 at over £120,000,000, figures which, compared with the tonnage output, show a marked increase in values. Meanwhile, the exports have risen from a tonnage of 24,000,000 tons in 1887, valued at £10,000,000, to an export close on 65,000,000 tons valued at £41,000,000. The question of the output and disposal of coal is of the highest importance to the United Kingdom, for it is on the basis of the coal-supply that the industrial system of the United Kingdom has been raised. This is not the place to enter on a vexed and difficult question, but the rapid exploitation of the coal resources of the country and the increasing exports of this wealth which, once used, cannot be replaced, is a subject of serious concern, affecting as

it does not only directly the general system of industrial production which has been built up in the United Kingdom, but also the general cost of living, and thereby again the comparative costs of industrial production.

Turning from the coal industry, that which is next in Iron ore. importance as regards the metal industries is the production of iron ore. Here the position stands in striking contrast to that of the coal industry. The Census of Production shows that for the year 1907 the total output of iron ore in the United Kingdom amounted to 14,988,000 tons, valued at £4,315,000. The exports amounted to 15,000 tons, while the net imports amounted to 7,254,000 tons. The imports, while in tonnage little more than half the output of native ore, represent a much higher value per ton, for the production of pig-iron from British ores in 1907 was returned as 5,126,949 tons, valued at £19,004,413, while the production from foreign ores amounted to 4,987,332 tons, valued at £18,486,886. Thus the total value of the output of pig-iron amounted to £37,500,000.

This brings us to the consideration of the very wide and Iron and steel industries. important group of industries which, like pig-iron, are grouped under 'iron and steel'. The gross output of this large and representative class is returned by the Census of Production in the year 1907 at £377,436,000, and the number of persons employed is stated at 1,539,415. But the gross output involves a very considerable amount of duplication. The value of iron or steel may be returned two, three, or more times in the value of semi-manufactured or finished articles, as the value of the parts reappear in the final product. But when all such duplication has been as far as possible eliminated, the Census of Production estimates the value of the net product of the combined industries at between £244,000,000 and £251,500,000. Of this large total the exports of iron and steel products in 1907 were valued at £96,668,000 free on board, a sum which does not include the value of electrical goods and machinery, with which the total approximates to £100,000,000. The net imports of iron and steel goods

were £16,029,000, and, if electrical goods imported are included, the net total approximates to £17,750,000.

It is thus seen from these summary figures that over 1,500,000 persons are employed in the iron and steel industries, that the net total product amounts to approximately from £240,000,000 to £250,000,000, and that of this amount roughly £100,000,000 is exported—while the imports, which include a considerable amount of semi-manufactured materials, amount to less than £18,000,000.

It is only possible here to note some of the outstanding features in this very wide and varied group of industries. The whole length and breadth of the iron and steel trades is here represented from the pig-iron furnaces to the engineering shop. The largest branches of the trade, following the census classification, are the smelting, rolling, and founding works, employing 261,666; the engineering trades, employing 461,703; and the ship-building and marine trades, employing 188,312. Other large groups are the galvanized sheet and hardware trades, employing 74,777; the cycle and motor trades, 54,043; anchor, chain, nail and screw trades, 28,024; the tool and implement trades, 27,711; while the tinplate, iron and steel tubes, the cutlery, and many other branches also employ very considerable numbers. Apart from the regular private manufacturing firms, no less than 283,071 are returned as employed by railways and government departments on construction and repair of iron and steel works.

Semi-manufactured and finished iron and steel goods.

The output of these industries as a whole may be divided into two main groups; (1) the export of semi-manufactured goods; and (2) the output of finished iron and steel goods, this being in turn divided into (*a*) exports and (*b*) the quantity retained for home use—the output of semi-manufactured goods not exported being represented in the finished products. With regard to the first group, viz. the export of semi-manufactured materials, the census returns indicate an export of £19,204,000, the largest items being pig-iron, £7,196,000; steel ingots, bars,

girders, &c., £4,376,000; plates, sheets, armour plates, &c., £3,961,000; wrought iron and steel tubes, £2,148,000. There is thus a considerable export of such semi-manufactured materials. The second main group, viz. finished goods, is very much larger, and the output is estimated in the census to be of a value from £213,176,000 to £220,341,000. In this very large total are included railroad iron and steel, £7,283,000; pipes and fittings, £2,019,000; galvanized sheets, £7,157,000; tinned plates, £7,402,000; wire and wire manufactures, £4,845,000; bolts and nuts, £1,979,000; screws and rivets, £1,817,000; grates and ranges, £2,053,000; hardware, &c., £2,602,000; tinplate and japanned goods, £3,229,000; cutlery, £1,527,000; tools and implements, £5,250,000. But there are three items which are outstanding, two of which between them represent the half of the final output of the iron and steel industries. The output of the general engineering (except marine engineering) trades was returned at a figure estimated to be from £82,500,000 to £86,500,000. The net output, which represents the value of the product over the cost of material, &c., was £50,495,000. The following statement shows the production, exports, and imports of the more important branches of the general engineering trades:

	<i>Production.</i>	<i>Exports, 1907, of U.K.</i>	<i>Imports, 1907, into U.K.</i>
	£	£	£
Steam engines	12,708,000	7,900,000	74,000
Machinery other than electrical .	38,583,000	22,848,000	3,235,000
Electrical goods, machinery, cables, &c.	15,210,000	3,739,000	1,657,000

The second large item in the iron and steel industries is that of the ship-building and marine engineering trades, the output of which is estimated at £45,500,000 to £46,500,000, while the net output, i.e. the value of work done, excluding value of materials used and work given out, was returned at £18,534,000. The above figures include work done at government dockyards, lighthouse authorities, &c. But considering the work done by private firms alone, the following statement shows the production and exports in the year 1907:

Ship-
building
and
marine
engineer-
ing.

	Production.		Exports 1907.	
	Tonnage. Tons displacement.	Value. £	Tonnage. Tons displacement.	Value. £
War vessels . .	63,000	3,512,000	6,600	555,000
Steam ships :	<i>Tons gross.</i>		<i>Tons gross.</i>	
Hull and fittings .	1,598,000	19,388,000 8,040,000	540,000	6,586,000
Machinery . .	—	to 8,540,000	—	2,551,000
Sailing vessels .	16,000	255,000	3,300	45,000
Boats	—	512,000	—	281,000
		31,707,000		10,018,000
		to 32,207,000		

The third item which calls for special notice among the iron and steel industries is that of the cycle and motor trades—a rapidly expanding branch of industry. The output of these trades is estimated by the Census of Production at between £10,900,000 and £12,900,000 in 1907, the net output, representing value of work done by these trades, being £5,901,000. The greater part of this production is for home consumption, but there are also considerable exports, though imports are still greater, as will be seen from the following statement :

	Production.		Exports. 1907.		Net imports. 1907.	
	No.	£.	No.	£.	No.	£.
Motor-cars, complete .	9,800	3,323,000	2,300	858,000	4,300	1,834,000
Cycles, except motor-cars .	623,800	3,441,000	102,400	509,000	600	5,000
Motor-cycles .	3,800	139,000	800	28,000	1,700	48,000
Motor chassis .	2,000	859,000				
Cycle and motor parts	—	3,144,000	—	1,272,000	—	2,516,000

Summary
of iron
and steel
trades.

Thus, reviewing this very important side of national production, the iron and steel trades, the following summary may be made for the year 1907 :

Exports of semi-manufactured goods	£19,000,000
Exports of manufactured goods .	£81,000,000

These values of exported goods are, however, free on board, and not the value at the works, which is less, and deducting 10 per cent. for cost of transit on goods exported, it may be therefore estimated that the value at

the works of the remainder for consumption in the United Kingdom is approximately £150,000,000 to £160,000,000. It thus appears how great a factor in home production and in export trade is the group of iron and steel industries of the United Kingdom.

The metal trades other than iron and steel call for a much briefer notice. The trades included in this group are the copper and brass trades, gold and silver refining, lead, tin, zinc and other metal trades, and also the plate and jewellery and the watch and clock trades. Taking this group of trades as a whole, it is estimated that the output was in 1907 approximately 87½ or 88 million pounds sterling. Seven-eighths, however, of this large total consist of the value of materials used, and the net output, which represents the value created in this country by labour and capital, was returned at £11,893,000. The total number of persons employed, except out-workers, averaged 114,473—the largest trades being the copper and brass (smelting, rolling, and casting) trades employing 21,448 workers, the finished brass trades 38,916, and the plate and jewellery trades 38,388. The watch and clock trades employed an average of 5,301. It is of interest to note that the value of exports belonging to this group was returned at £11,886,000, free on board, while the corresponding imports amounted to a value of £22,411,000. It is evident how preponderant are the iron and steel trades in the metal industries of the United Kingdom.

The third group of industries in the United Kingdom is that of the textiles and the clothing industries. The output of the textiles—not including for the present the clothing industries—was estimated by the Census of Production, after eliminating all duplication, at a sum between £231,000,000 and £234,000,000. This amount includes the value of the raw materials and imported semi-manufactured materials—cotton, silk, wool, flax, jute, &c. The value of the processes of manufacture carried out in the United Kingdom, which represents the ‘net output’ of the British and Irish textile industries,

Textiles :
output.

is estimated at between £94,000,000 and £95,000,000—the cost of materials being about £136,000,000 to £140,000,000.

Of the total output of £231,000,000 to £234,000,000, as valued at the factory, goods valued at the port at £163,936,000 were exported, and if the value of such goods at the factory is taken as approximately £148,000,000 there remain for home consumption textiles to the value at the factory of from £83,000,000 to £86,000,000. The net imports amounted to £33,734,000, this figure including, however, semi-manufactured goods, valued at £6,923,000. Thus, in round figures, it would appear that the United Kingdom in 1907 consumed £110,000,000 to £113,000,000 worth of textile goods, of which, approximately, three-fourths were of home manufacture and one-fourth imported. Even if the census figures may be only approximately accurate, this gives a general view of the position of home production relative to imports which is of great interest.

Cotton
manufac-
ture.

Regarding the several branches of the textile industry, the most striking fact is the relatively great importance of the cotton industry. The final product of that industry for export or home consumption is estimated at between £131,000,000 and £133,000,000, considerably more than half the total value of the textile industries. The product of the woollen and worsted industry amounts to £65,000,000, less than half the total value of the cotton output; the jute, hemp, and linen trades give an estimated total of £23,000,000, considerably less than half the total value of the woollen industry. The output of silk materials is of a total value of £4,250,000 to £4,500,000. Lace goods amount to £6,974,000, and hosiery goods to £8,792,000. These figures furnish very interesting data in considering the importance of the respective branches of the textile industry in the United Kingdom. A second index of the magnitude and value of the more important branches of textile industry can be had by noting the net output—that is, the value added to raw materials or imported or semi-manufactured goods—and the numbers employed

in the several industries. These two figures, stated side by side, are as follows :

	<i>Net output. £</i>	<i>Numbers employed.</i>
Cotton	45,007,000	572,062
Woollens	18,597,000	264,021
Jute, hemp, and linen	9,452,000	154,496
Silk trades	1,762,000	32,198
Lace goods	3,595,000	36,840
Hosiery	3,139,000	51,213
Bleaching, printing, dyeing, and finishing textile trades	10,483,000	103,813

These figures confirm no less strikingly the paramount position which the cotton industry holds among the textiles, while they adjust somewhat more fairly the relative importance of the woollen, linen, jute, and hemp industries. The bleaching, printing, and dyeing trades are mainly subsidiary to the main branches of the textile trades, and the value of work done appears in the final product of the several trades.

Turning to note the more important particulars in the above trades, in the case of the cotton industry the value of raw cotton imported (excluding re-exports) was, in 1907, £60,918,880. The product made from this material consisted first of cotton yarn estimated at 1,800,000,000 lb., and its selling value at £90,000,000. 241,077,000 lb. of cotton yarn were exported, representing about 13·4 per cent. of the total quantity made in the United Kingdom, the value of which, free on board, was returned at £15,417,000. The value of foreign yarn imported was only £394,835. As regards the manufacture of the yarns retained in the United Kingdom and of imported yarns, it is estimated that the output of (1) cotton piece goods (unbleached, bleached, dyed, or printed) amounted to a value of £94,500,000 ; (2) other cotton manufactures (including belting and waste), to a value of from £10,500,000 to £12,500,000 ; while (3) the value of cotton yarn used in the manufacture of lace, hosiery, and elastic belting is estimated at £4,300,000. To these sums have to be added (4) the value of cotton yarns, estimated at £5,600,000, used for mixing with other textile materials. The total net production of the

cotton industry is thus estimated from £131,000,000 to £132,000,000. In 1907 the value of cotton manufactures exported (including yarn, but excluding hosiery, lace, and rope) reached no less a sum than £105,000,000, while the total value of the net imports was £3,900,000. But it must be remembered that the total production is the value at works, and that the comparable value of exports is probably rather under £100,000,000. It would appear, however, that over 75 per cent. of the production of the cotton industry is exported. No industry depends so entirely on imports for its raw material, and so much on exports for its market.

Woollen
and
worsted
manufac-
tures.

With regard to the second greatest of the textile industries, viz. the woollen and worsted manufactures, again the production of the United Kingdom depends mainly on imported materials. The net imports of wool, wool waste, &c., amounted in 1907 to £22,718,053, while the home-grown wool retained for manufacture may be estimated at £4,500,000 to £5,000,000, and the census estimated the value of the make of pulled wool in the United Kingdom at £3,750,000. The net imports of woollen and worsted yarn were of a value of £2,659,711. Regarding the industry as a whole, the estimated net value of the production of the woollen and worsted goods in the United Kingdom is about £65,000,000 or £66,000,000—the main items in which total are as follows: (1) yarns exported, £8,570,000; (2) tops and noils exported, £3,861,000; (3) yarns sold to hosiery manufacturers, £3,640,000; and (4) woollen and worsted tissues manufactured, £46,720,000. This last figure is of special interest. Excluding hosiery, the returns of exports of woollen and worsted tissues show, in 1907, a total value of £20,565,000, so that allowing for the difference between export and Census of Production values, it would appear that about 40 per cent. of the output of the woollen and worsted tissues are exported.

In connexion with the woollen and worsted manufactures, it should also be noted that the hosiery trades represent a widely scattered and growing branch of

industry, the value of the output of which in 1907 was estimated at £8,991,000. It is only possible to compare approximately home production with exports and imports of hosiery, but it would appear that exports in 1907 exceeded £3,000,000, while imports were from £2,000,000 to £2,500,000 in value.

The silk trade of the United Kingdom presents a striking contrast to the other branches of the textile industry. The imports of silk are considerable, raw silk material and silk yarns amounting in 1907 to £2,820,716, while the imports of silk manufactures reached £12,862,834. The home manufacture, on the other hand, is small and comparatively stationary. The Census of Production estimated that the value of the output of the silk trades, taken as a whole, was in 1907 approximately £4,250,000 to £4,500,000, and this estimate covers the output of artificial silk and the cost of cotton and linen used in making mixed goods where the goods are known under the name of silk. The export of silk material and yarns in 1907 was £441,222, while the value of silk manufactures exported was returned at £2,009,613.

Reference may also be made at this point to the lace trade, which is a considerable industry in the United Kingdom. In England the industry is one of machine-made cotton net, lace, curtains, &c. There is also a small trade in silk net and lace, while in Ireland the lace industry is mainly a home or school industry of hand-made linen lace. The total output of the lace trades is estimated at about £7,000,000. The chief export is of cotton lace and net, amounting in 1907 to £4,871,889, while the corresponding imports amounted to £1,702,123.

Much more important as a national industry, and ranking third in importance among the textiles, is the linen industry. Flax grown in the United Kingdom and retained there for manufacture is estimated in 1907 to have amounted to a value of approximately £600,000, while the net imports of flax and tow or codilla amounted in the same year to a value of £3,825,000. According to the Census of Production, the value of linen yarn made

in 1907 was £7,967,000, and the value of the exports of the same, £1,243,000, while there was a corresponding net import of linen yarn amounting to £786,000. The total linen yarn retained for manufacture in the United Kingdom was valued at £7,510,000, while the value of linen piece goods, including the value of making up linen goods, amounted to £11,632,000. The export of linen piece goods and mixtures in 1907 was returned at £7,050,000, and the corresponding imports of linen manufactures at £841,000. It is estimated that 60 per cent. of linen piece goods and made-up goods are exported to foreign and colonial countries.

Hemp and
jute
goods.

There is also a considerable manufacture of hemp yarn, cordage, &c., the value of which seems to have been in 1907 approximately £4,825,000. More important is the manufacture of jute yarn and piece goods. The production of jute yarns in 1907 was estimated by the Census of Production to amount to £6,500,000, of which amount £1,232,000 was exported, there being an import of jute yarns valued at £103,000. Jute piece goods, &c., manufactured in the United Kingdom, were of a value of £5,823,000, of which the exports were estimated, free on board, at £2,749,000.

Textile
imports
and
exports.

The above facts show the main features regarding the output and disposal of the chief branches of the textile industries of the United Kingdom. It is plain that in all cases the export trade disposes of a very large part of the annual product, amounting approximately in the case of cotton goods to 75 per cent., of linen goods to 60 per cent., and of woollen goods to 40 per cent., while correspondingly these industries depend in the case of the cotton and jute industries entirely upon imported material, and in the woollen and linen industries to an extent approaching three-fourths of their materials of manufacture.

Clothing
trades.

Closely allied to the textile trades are the clothing trades, which include the millinery, apparel, and making-up trades, and also the trades in furs, feathers, artificial flowers, &c. The group of clothing trades represented in 1907

an output of approximately £73,000,000 to £73,500,000. In the above total, much the largest item is that of apparel, millinery, and haberdashery, the net value of the output of which was estimated between £63,000,000 and £64,000,000, and if we include the special hat, bonnet, and cap industry, the production of which is approximately £5,000,000, the total of this trade is approximately £70,000,000. It is not possible to compare this output with imports and exports respectively, owing to difficulties of classification, but the trade statistics show that the exports of 'apparel' in 1907 were returned at a value of £5,634,000, while imports were valued at £2,726,000, and if the whole group of the clothing industries is considered, so far as comparison is possible, the exports would appear in 1907 to have amounted to a value free on board of over £10,500,000, while the corresponding net imports amounted to approximately £9,750,000. By far the greater part of the production of the clothing industries is thus for home consumption.

Taking together then the two main groups of the textile and clothing industries, the first representing an output of from £231,000,000 to £234,000,000 and the second an output of £73,000,000 to £73,500,000, it is evident that from the nature of the case there is a large amount of duplication between these two groups. Thus the cloth of the textiles is made up in the clothing trades. The 'net output', however, of the clothing trades, excluding leather goods, is approximately £38,000,000, and if an allowance of £4,000,000 to £5,000,000 is made for stuffs not duplicated from the textile group, it may be estimated that from £42,000,000 to £43,000,000 must be added to the textile and clothing trades, which would thus appear to be of a value in round figures about £275,000,000.

So far we have considered the main groups of industry in the United Kingdom, but outside these main groups there remain other industrial undertakings which play a large part to-day in the production and trade of the

Other
trades and
industries.

United Kingdom. Of these, however, a brief summary must suffice. Following the classification adopted in the Census of Production we may distinguish: (1) the chemical and allied trades; (2) the paper, printing, and allied trades; (3) the leather, canvas, and india-rubber trades; (4) the wood and timber trades; (5) the stone, clay, pottery, and glass trades; (6) miscellaneous trades.

Chemical
and allied
trades.

1. It is not possible to state the precise value of the chemical and allied trades as a whole, owing to the fact that there is a considerable amount of duplication between trade and trade; for example, between soda compounds and soap, coal-tar products and disinfectants, oils and paints, glycerine and explosives. But the following statement shows the estimated value of the output of each trade (substantially free from duplication within the same trade):

	£	Value.	£
Chemicals, coal-tar products, drugs, and perfumery trades	18,000,000	to	22,000,000
Seed-crushing trade		13,250,000	
Oil and tallow trades (excluding seed-crushing)	6,200,000	to	7,500,000
Fertilizer, glue, sheep-dip, and disinfectant trades	7,423,000	to	8,123,000
Soap and candle trades	11,631,000	to	11,676,000
Paint, colour, and varnish trades	7,321,000	to	8,600,000
Explosives, ammunition, and fireworks trades	4,000,000	to	4,500,000
Match and firelighter trades		848,000	

The number of persons employed in these industries was returned as 127,842, and the 'net output' which represents the value added by labour to the materials employed in the industry amounted to £21,557,000. It is thus evident that this branch of trade is one of considerable importance to-day in the United Kingdom, and it seems not improbable that the total value of the output free from all duplication may exceed £50,000,000. The value of exports of the products of this group in 1907 was approximately £25,000,000, while the net imports exceeded £30,000,000.

Paper,
printing,
station-
ery.

2. The paper, printing, and stationery trades give even a larger amount of employment than the chemical trades, the total number employed, excepting outworkers, amounting to 325,000. It is estimated that in 1907 the

total value of the product of this industry amounted to a sum between £50,000,000 and £51,000,000. The value of the output in the paper-making trade alone is estimated at from £12,500,000 to £13,000,000, while that of the printing, publishing, and book-binding trades amounts to a total exceeding £26,500,000. The net output of this group of trades was returned at £33,650,000 in 1907. The value of the net imports amounted in 1907 to £6,645,000, while exports were of a value of approximately £6,599,000. The production of this industry is, therefore, as might be expected, chiefly for home consumption, and the home product largely exceeds the imports of similar character.

3. The value of the products of the leather, canvas, and india-rubber trades in 1907 (excluding boots and shoes and gloves) was estimated by the Census of Production at a figure lying between £29,750,000 and £34,000,000. The following statement shows the value of the main groups in this class in 1907, free from duplication within each group, but subject to a certain amount of duplication between group and group :

	£
Fellmongery products	2,882,000
Leather trade products (tanning, dressing, &c.)	14,600,000 to 17,300,000
Saddlery and harness goods	1,700,000 to 2,000,000
Travelling bags and fancy leather goods	1,531,000 to 1,550,000
Sacks and canvas goods (including work done for merchants)	2,428,000
India-rubber goods	8,820,000
Total	31,961,000 to 34,980,000

The total number of persons employed in these trades was returned in 1907 at 84,724, excluding outworkers; while the 'net output' representing the value added by labour to the raw materials was returned at £8,618,000. Very large imports of semi-manufactured goods take place in connexion with this group of industries, amounting in 1907 to nearly £17,000,000. This total includes fellmongery, £1,855,000; hides, £2,039,000; leather, £7,268,000; leather goods, £587,000; rubber, £4,824,000; while the corresponding exports were of British skins, £1,735,000; hides, £520,000; leather, £2,632,000; leather

goods, £458,359 ; leather machinery belting, £537,000 ; saddlery and harness, £578,000.

Boots,
shoes, &c.

In the Census of Production, as has been pointed out, the boot and shoe trades and also the leather glove trades are included in the section dealing with the clothing trades. The total output in 1907 of boots and shoes, leggings, &c., including goods made of canvas and rubber, was estimated at a value between £22,500,000 and £23,000,000, while the output of the leather glove trade was valued at £589,000. For the same year the exports of boots, shoes, slippers, &c., were returned at £2,384,000, and the corresponding imports at £848,000. The net imports of leather gloves amounted to £938,694. The number of persons employed in the boot, shoe, and allied trades, &c., was returned at 126,826, while the net output of these trades was estimated at approximately £9,250,000. Taking the leather industries as a whole, including the boot and shoe industries, &c., and the canvas and india-rubber trades, it may be estimated that the net value of the product amounted to a total of £40,000,000 to £45,000,000.

Wood and
timber.

4. Under the heading of the wood and timber trades are included not only the saw-milling trade, but the furniture and furnishing trades, the crate and box trades, the carriage and wagon trades, and the coopering, basket, and brush trades. Within this group there is a considerable amount of duplication of values in the return made by the several branches of the trade. But the census authorities estimated that in 1907 the value free from duplication was to be placed at a sum between £31,000,000 and £38,000,000, while the value of house furnishings and work done on buildings amounted to £9,750,000. The net output of these trades reached in 1907 £21,442,000, and the number of persons employed was returned at 239,160. With regard to imports and exports, there are very large imports of hewn and sawn timber valued in 1907 at £23,844,000, the exports being negligible. The imports of manufactured goods in this class were valued at £3,710,000 and the exports £2,418,000.

5. The group of industries including brick, fire-clay, ^{Brick,} china, and earthenware manufactures, cement, asbestos, ^{earthen-} ware, and boiler coverings, glass, roofing felts, &c., accounted ^{glass, &c.} in 1907 for the employment of 205,614 persons, with a net output of over £17,000,000. The output, including the value of the material used, would appear to have been approximately between £27,000,000 and £28,000,000. The main items in the total value of the home output were: bricks, £7,572,000 to £7,757,000; china, earthenware, ornamental tiles, &c., £7,864,000; glass and manufactures of glass, £4,628,000. The chief exports in 1907 consisted of china and earthenware goods (£2,649,000), amounting to about one-third of the home production, while the value of the imports (£880,000) was little more than one-ninth of that of goods made in the United Kingdom. In the glass industry the exports (£1,400,000) amounted to about 30 per cent. of the value of the total output, while the net imports (£2,972,000) reached nearly two-thirds of the value of similar products made in the United Kingdom.

6. Finally, a brief notice is required of the last group ^{Miscel-} in the Census of Production report, namely, the miscel- ^{laneous} ^{trades.} laneous trades. These include the manufacture of scientific instruments, musical instruments, billiard tables and sports requirements, fancy articles, toys, and games, &c. The total number of persons regularly employed in these industries is returned in 1907 at 46,874, and the 'net output' of the work done amounted to £4,443,000, while the total value of the products taken as a whole within this group is estimated at between £8,500,000 and £9,000,000. The census has not found it possible to make a strict comparison, however, between imports and exports and home production, but the following table furnishes data with regard to some of the chief articles of these trades:

Subject.	Home production.		Exports.	Imports.
	£	£	£	£
Scientific instruments . . .	2,464,000	to 2,560,000	812,000	602,000
Musical instruments . . .	1,582,000	to 1,843,000	293,000	1,044,000
Billiard tables and sports requisites . . .		2,041,000	534,000	1,210,000

The comparison, however, between home production, imports, and exports of these articles can only be regarded as roughly approximate, owing chiefly to inadequate classification in the published returns of imports and exports.

General
consider-
ations.

From the foregoing summary and analysis it will be seen how wide and varied is the range of production in the United Kingdom and how closely connected production is with the import and export trades.

Let us briefly sum up the outstanding features of the situation.

First of all it will be recognized that it is now possible to form a much more exact comparison with regard to trade and production than was hitherto possible. This is due to the provision of a systematic survey of production as established in accordance with the Census of Production Act, and while information is available only with regard to the output for the year 1907, nevertheless it is possible to see henceforward in a measurable form many of the important relations between internal production and external trade. Throughout, however, it must be borne in mind that information is often imperfect in respect of classification, and especially as regards the mutual adjustment of 'production' and of 'import and export' figures. Therefore, what has been done must be regarded as an approximation only, which nevertheless indicates broadly the significance of the main branches of production and trade.

Home and
external
consump-
tion.

Secondly, it appears from the evidence that in the year 1907 the net output of British industry including agriculture and fisheries was represented by a sum approximating £856,000,000. But in this total are not included the building and contracting trades, or the public utility services, inasmuch as the object in view has been to see mainly the relations which exist between home production and foreign trade. If to this sum is added the value of imported materials which undergo some process of manufacture in the United Kingdom, the total output may be approximately placed at £1,270,000,000. Of this total,

which is the value at the mine, factory, and farm, a part estimated at the place of production at £383,000,000 was destined for export, leaving approximately a sum equal to £887,000,000 as the output wholly or partly of British or Irish manufacture for consumption in the United Kingdom.

Thirdly, it is evident that there has been a great expansion in the external trade of the United Kingdom, both in respect of imports and of exports. The outstanding character of imports is that they consist mainly of food-stuffs and of raw materials, and it must be noted that a large part of those imports which are classified as 'wholly or mainly manufactured' are goods which receive a further stage of manufacture before they pass to the consumer. On the other hand, in the case of exports, while there is a large and increasing export of raw materials, these consist mainly of coal, and while there is also a considerable export of goods classed as 'mainly manufactured' which undergo in other countries a final process of manufacture or preparation, yet the outstanding feature of the exports is the large proportion of finished articles, particularly and increasingly so in connexion with the exports to other parts of the British Empire. Further, there is also a very large and increasing re-export trade, indicating that, despite the great growth of direct communications, a very large trade in distribution of foreign and colonial goods to other foreign and colonial countries is done through the United Kingdom.

Fourthly, concerning the production of the United Kingdom, it should be noted: (1) that agriculture is still the greatest of British industries, and that while Great Britain depends largely on imported food-stuffs, the home production in recent years is not losing ground, but in some very important fields is tending to gain; (2) that as regards mining, the increasing output of coal, the increasing price, and the increasing ratio of export stand out as the most noteworthy features; (3) that the iron and steel industries represented in 1907 an output of approximately £250,000,000 and an export of, in round

Expansion in external trade.

Relative position of great industries.

figures, £100,000,000 ; whereas imports amounted to less than £18,000,000 ; and that in this group of industries the outstanding trades are the shipbuilding, engineering, machinery, and motor trades, and that there is evidence of great vitality and expansive power in this branch of industry ; (4) that the textile and clothing industries represent an annual output which may be estimated in 1907 at approximately £275,000,000 ; that these industries depend much more completely on foreign and colonial sources for raw material and on foreign and colonial markets as an outlet for manufactured goods ; that in the textiles the outstanding position of the cotton industry is strongly marked, but that a notable feature of development indicated by the trade returns of imports and of exports is the remarkable expansion which has taken place in the woollen and worsted industries in respect of exports, falling imports of like articles indicating plainly the expansion which has been taking place in home production, both for the home and for the foreign and colonial market.

General
condition
of British
industry.

Finally, the Census of Production has brought out the very wide range and importance of many trades which lie outside the great groups of the 'iron and steel' and the 'textile' trades ; and that whether the leather, or the paper, or the chemical trades are taken, there is evidence of the vitality of industry in the United Kingdom to-day. The study of the Census of Production and of the records of imports and exports shows that British industry is in a very strong position, and that its capacity for expansion is still remarkable.

CHAPTER IX.

COMMUNICATIONS

By O. J. R. HOWARTH

It is no part of the function of the present notice to trace in detail the evolution of the modern railway in England, its birthplace. But it is pertinent to recall certain conditions which primarily influenced the origin and development of railways. The prime influence was that of the wealth of the country in minerals, and especially coal, and this (it should be remembered) throws back to a period long before that of the introduction of the steam-engine, or even that of canal construction, to which reference will be made later. It is thus in certain of the coal-mining areas of England that the origin of the railway is found: the roads, incapable of bearing the constant cartage of heavy loads without wearing rapidly into deep ruts, were repaired with timbers laid in the ruts as early as the sixteenth century in the coal area of the Tyne (Northumberland and Durham). The natural steps in the development of this system were to sheathe the wooden rails in metal to ensure longer wear, and at length to make the whole rail of metal, as was first done in the latter half of the eighteenth century; similarly iron was substituted for wood in the construction of the wheels of vehicles: it was necessary to keep the wheel in place on the rail, so that first the rail and then (as now) the wheel was provided with some form of guide or flange. By the beginning of the nineteenth century railways for horse-drawn vehicles were widely distributed in Scotland, in the mineral districts and elsewhere in England, and in the coal district of South Wales, where (for example) there was a complete system of some 150 miles of line. The railway, then, as a means of communication, has a history of more than two centuries before the introduction of steam traction, and

Railways:
develop-
ment
before
introduc-
tion of
steam
traction.

even its use for the conveyance of passengers was recognized before that event—for the first time, appropriately enough, in the neighbourhood of London, where a railway between Wandsworth and Croydon was opened to the public in 1803.

Develop-
ment
after
introduc-
tion of
steam
traction.

The geographical connexion between the coal areas and the evolution of the railways holds good, naturally, when the evolution of the steam locomotive is considered. South Wales in 1804, the Leeds district (West Riding of Yorkshire) in 1811, the Newcastle district in 1813, witnessed early experiments in steam traction. The famous Stockton and Darlington line was opened in 1825: the opening of the Liverpool and Manchester line (1830), however, really marked the initiation of the existing railway system. Till that period the chief function of railways had been viewed as the carriage of heavy goods (such as coal) in bulk between their point of origin and the nearest navigable river, canal, or seaport: and thus the earliest railway system followed a line of development which may be traced, or (in 'new' lands) even watched at this moment, in the development of railway systems generally, whose primary function is to connect port and hinterland, or to form merely an adjunct to a system of inland waterways. The supersession of waterways by railways in the United Kingdom will be considered in a later paragraph.

Origin
and
number
of rail-
way com-
panies.

When the public confidence in railways was once established there set in a mania for their development, which passed, in a measure, beyond control, even though quite a moderate proportion of the schemes proposed received the countenance of the administration and the sanction of the Government. About the years 1842–6 especially, the planning of railways and speculation in their shares partook of the nature of a disease, for which a financial crisis in 1847 served in some measure as a purging medicine. At this period and later a very large number of separate railway companies came into existence, and there have survived till present times instances of railways bearing titles of far greater range than that

of their actual lines, and thus testifying to the unrealized ideals of their promoters. Thus, a single line of railway, serving a remote district in western Wales from Aberystwyth to Pencader, bore until recently (when it was absorbed into the Great Western system) the high-sounding name of the Manchester and Milford Railway. The process of amalgamation, whereby the lines of a number of companies have been brought under the control of a single one, has been common in the history of British railways, but at the present day about 120 separate companies work the railways of the United Kingdom. The great majority are in England and Wales; Ireland has 24, Scotland only 8, while the Isle of Man has a small line bearing the name of the island, and in Jersey (Channel Islands) there are two—the Jersey and the Jersey Eastern. The number of small lines, of strictly local importance, is still large (proportionately) in England and Wales and in Ireland, though not in Scotland, for the number of large systems of more than local importance can be narrowed down to some 15 in England, 4 in Ireland, and 5 in Scotland. These may be detailed here.

In England and Wales, firstly, radiating from London, there are the following systems (from south, by west, to north and east).

South-Eastern and Chatham (this curious title indicates a working union in 1899 of the South-Eastern and the London, Chatham and Dover railways). The lines of this system are chiefly in the county of Kent, the coast and parts of which are served from termini in London at Victoria, Charing Cross, Holborn Viaduct, and Cannon Street. This system has a major share of traffic with the continent of Europe, as it controls the short routes between Dover and Calais, Folkestone and Boulogne, and others.

London, Brighton and South Coast. This system, from termini at Victoria and London Bridge, serves the coast from Hastings to Portsmouth.

London and South-Western, from Waterloo terminus, serves Portsmouth and Southampton and the southern

Principa
railways
of Eng-
land and
Wales :
Southern
systems.

Western
systems.

and south-western counties and coast as far as Plymouth, and also North Cornwall and Devon.

Great Western, a very extensive system, serving (from Paddington terminus) Bristol and the south-west to Penzance (Cornwall), South Wales (by the Severn Tunnel),

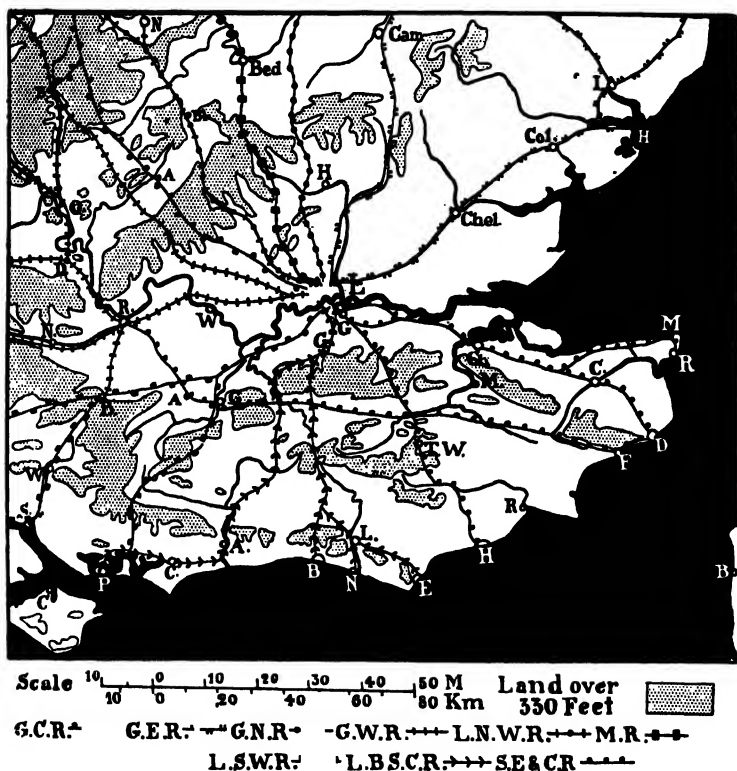


FIG. 50. The Main Railways radiating from London.

the West of England generally, and, by a northern trunk-line, Birmingham, Shrewsbury, Chester, and Birkenhead.

Northern systems.

Great Central, a provincial system, whose range was indicated by its title, the Manchester, Sheffield and Lincolnshire, till 1897, when a line was opened from Sheffield by Leicester, Nottingham, and Rugby to Marylebone terminus in London, the latest of the great English trunk-lines.

London and North-Western. This, the Great Western, and the Midland are the three most extensive English systems. The London termini are Euston and Broad

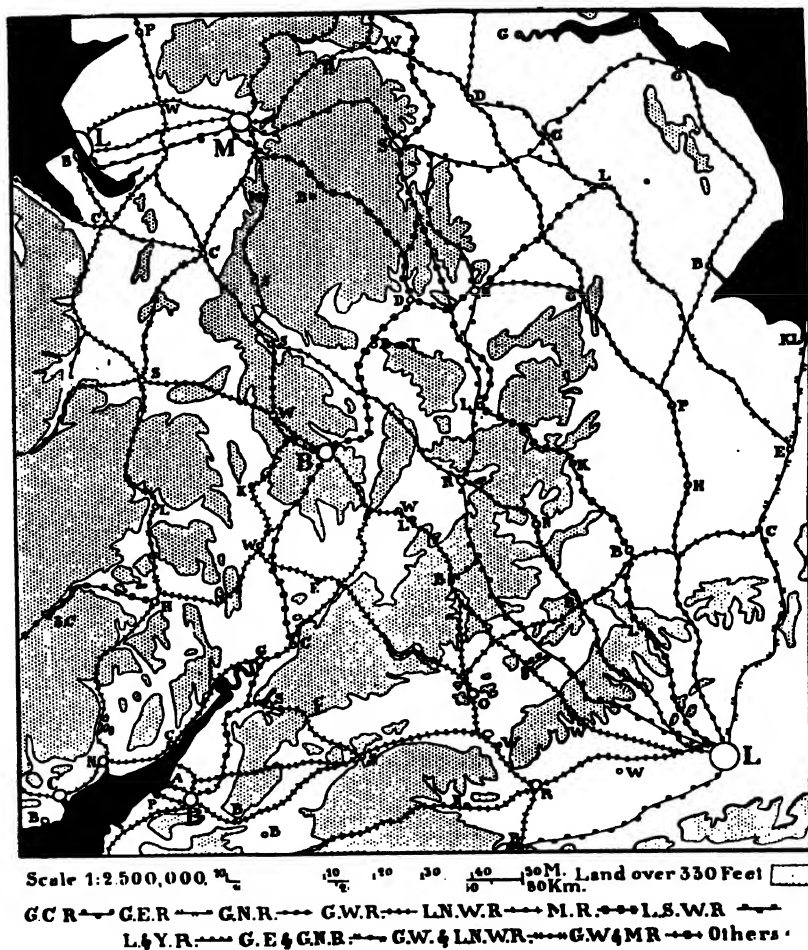


FIG. 51. Railways of the Midlands.

Street (City). The North-Western main line runs by Rugby, Crewe, Warrington, and Preston, to Carlisle, where it joins the Caledonian system of Scotland, the two forming the 'West Coast' route between England and

Scotland. Manchester, Liverpool and the north-west generally, North Wales, Birmingham, and the Midlands are also served by this system.

Midland. This system, whose nucleus was actually in the Midlands, now ranges from the mouth of the Thames to the north of Ireland, since it has acquired control on the one hand of the London, Tilbury, and Southend line (serving the north bank of the Thames estuary) and, on the other, of the Northern Counties Railway of Ireland (Belfast, Coleraine, Portrush, Londonderry, Larne, &c.). The London termini are St. Pancras and (for the Tilbury section) Fenchurch Street; and the main lines serve Bedford, Leicester, Sheffield, Leeds, and Carlisle (the 'Midland' route to Scotland), Nottingham, Derby, Manchester, Birmingham, Gloucester, Bristol, &c.

Great Northern, from King's Cross terminus, serves Peterborough, Grantham, and Doncaster, and with the North-Eastern and North British lines forms the 'East Coast' route between England and Scotland. The Great Northern has also lines in East Anglia (principally Lincolnshire), and connexions westward to Nottingham and other centres in the Midlands, the West Riding of Yorkshire, and Lancashire.

East
Anglia.

Great Eastern, from Liverpool Street terminus, serves East Anglia generally.

Provin-
cial sys-
tems.

The principal provincial systems are the North Eastern, which exercises practically a monopoly of railway communications from Leeds and York northward through the counties of York, Durham, and Northumberland, to Newcastle and Berwick; and the Lancashire and Yorkshire, which serves the manufacturing districts in the southernmost parts of those counties, extending from the Lancashire coast to Goole on the Humber. There may also be mentioned the Cheshire lines, which are worked by a committee representative of the Great Northern, Midland, and Great Central Companies; the Furness Railway, serving the coasts of Lancashire and Cumberland adjacent to the Lake District; the North Staffordshire, concerned primarily with the traffic of the industrial

district known as the Potteries (Stoke-on-Trent), and the Cambrian, serving central Wales (Whitchurch, Welshpool, Barmouth, Aberystwyth).

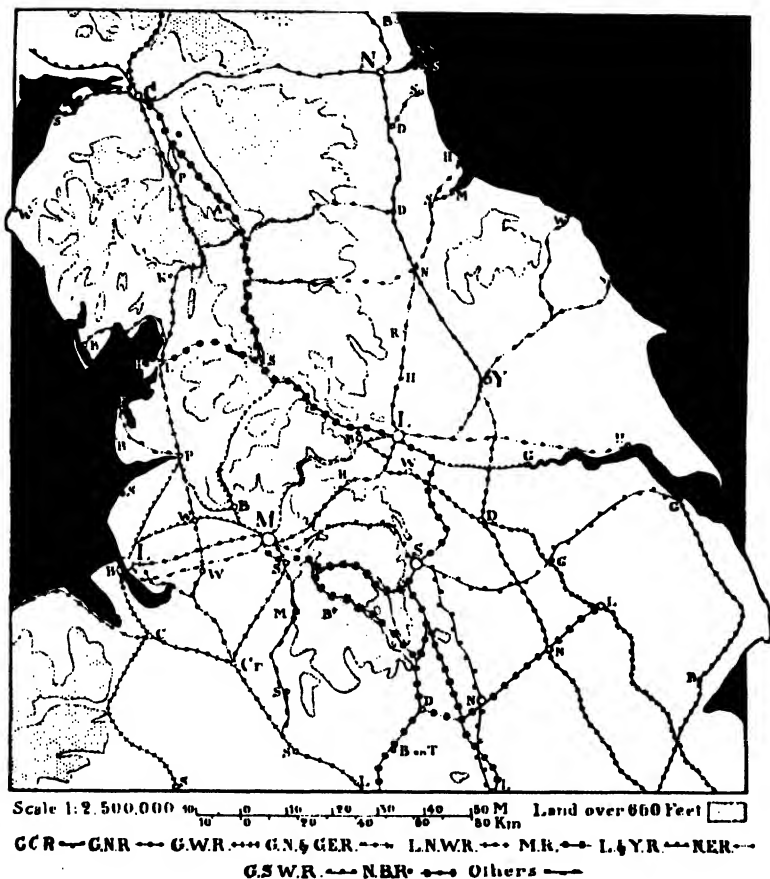


FIG. 52. Railways of the North of England.

In spite of the keen competition which exists at many points between many of the chief lines, there is also close inter-working between certain companies, not merely in the matter of through traffic, but also in respect of the administration of joint lines and other properties, and, further, of traffic arrangements between certain points

served by the agreeing companies. Thus, in addition to various directions in which such working agreements operate but do not directly affect the public service, one effect which should be mentioned here is that of affording through routes included in more than one system. The Anglo-Scottish routes have already been named : among other important connexions are those between the Great Central and the Great Western Companies' lines by way of Woodford, Banbury, and Oxford ; between the Midland and South-Western systems by their junction line from Cheltenham to Andover, and by the Somerset and Dorset line between Bath and Templecombe ; between the systems of the South-Eastern and Chatham and the Great Western Railways by way of Reading ; between the west and north by way of the joint line of the Great Western and North-Western Companies between Hereford and Shrewsbury ; and between Yorkshire and Lancashire and the east coast port of Harwich by a joint working of the Great Eastern and Great Northern Companies. Other connexions exist between northern and southern lines, passing through London.

Principal
Scottish
and Irish
railways.

The two chief Scottish systems are the North British and the Caledonian, which are in close competition. Both of them connect the chief cities, Edinburgh and Glasgow, each of these with Aberdeen, and Edinburgh with Carlisle, of course by different routes. The North British, as has been seen, joins the North-Eastern of England at Berwick. At Carlisle, the through trains from the North-Western system of England are conveyed both to Glasgow and to Edinburgh over the Caledonian lines ; those from the Midland are conveyed to Edinburgh by the North British, and to Glasgow by the Glasgow and South-Western Railway. The Great North of Scotland main line connects Aberdeen and Elgin, and that of the Highland Railway line runs from Perth to Inverness and Wick. The most extensive Irish system is that of the Great Southern and Western, which serves the greater part of the south and south-west of the country from Dublin ; the Midland Great Western extends from the capital to Galway and beyond ; the Dublin and South-Eastern and the Great



FIG. 53. Scottish Railways.

Northern, together with the Northern Counties section of the Midland Railway of England, complete the main lines of communication.

Distribu-
tion of
railways.

In a list of the European countries, showing the average mileage of railways per 100 square miles of territory, the United Kingdom stands second to Belgium and shows a much lower figure than that country (Belgium 43 miles, United Kingdom 19). But the average for England alone is $27\frac{1}{2}$ miles, and all such averages have to be used with due consideration to other circumstances. Belgium is a very small, densely populated country, with large mining and manufacturing industries. If we take a parallelogram of 3,000 square miles area of which St. Paul's Cathedral is the centre—such a figure covering roughly the area from Luton and Bishop Stortford on the north to Godalming and Tonbridge on the south, and from Chatham and Maidstone on the east to High Wycombe and Farnborough on the west—we find an average railway mileage per 100 square miles about equal to the Belgian average, excluding underground and other purely urban lines in London, and taking no account of sidings or multiplicity of tracks. Again, if we take an area of 1,000 square miles covering the South Wales coal-mining district, an average of 50 miles of railway per 100 square miles is found. No area equal to that of England and southern Scotland will be found to possess an equally close network of railways. Moreover, in England at least, the proportion of multiple tracks is very high; a double line of rails is rather the rule than the exception, and indeed, many of the main lines have a quadruple (or more rarely treble) track for long distances, or even more lines for shorter distances. Thus, while the route-mileage of railways in England and Wales is about 16,200, the mileage in terms of a single track is about 29,300; in Scotland the round figures are respectively 3,800 and 5,550, and in Ireland 3,400 and 4,000, from which it appears that in Ireland single-track lines are predominant, and in Scotland proportionately much more extensive than in England. (The above figures omit some 14,400 miles of sidings in the United Kingdom.)



FIG. 54. Irish Railways.

The extensive multiplication of tracks, necessitated by the high density of traffic, partly accounts for the very high figure of the capital invested per route-mile of railways in the United Kingdom, which is about £56,500, compared with £35,400 in Belgium, £25,300 in France, and £22,300 in Germany, but the extremely high standard of construction and maintenance of the lines of Great Britain has also to be taken into account. The capital per single-track mile is worth comparison as between the three kingdoms—for England and Scotland the figures differ little (£36,300; £33,500); for Ireland the sum is little over £11,000. The conditions of traffic in Ireland do not demand British standards.

Density
of traffic.

Another possible gauge of railway activity—but one which is difficult of close application—is supplied by the use of the formula

$$\frac{\text{Annual train mileage}}{365 \times \text{mileage of railways}}$$

from which it appears that the average 'density of traffic' over railways in the United Kingdom is about 50 trains daily. This is a much higher average than that of other countries of equally high commercial standing—thus Germany yields an average of 30, France one of 25, and the United States of America one of nearly 20. It is of interest, however, to observe that the difference appears to be made up mainly by passenger traffic: the average number of passenger trains daily on railways in the United Kingdom is about 30, on German railways 15, French 13, and America 12. Such a result the traveller who considers and contrasts the conditions in these countries will not be unprepared to expect, but again these generalizations are offered and must be received with caution, and, as has been premised, it would be very difficult to localize the application of this standard. For the sake of illustration, however, an attempt may be made to apply it to a particular branch of traffic in a particular locality.

Traffic in
the
vicinity of
London.

It is obvious that the heaviest local passenger traffic will be found on railways in the immediate vicinity of

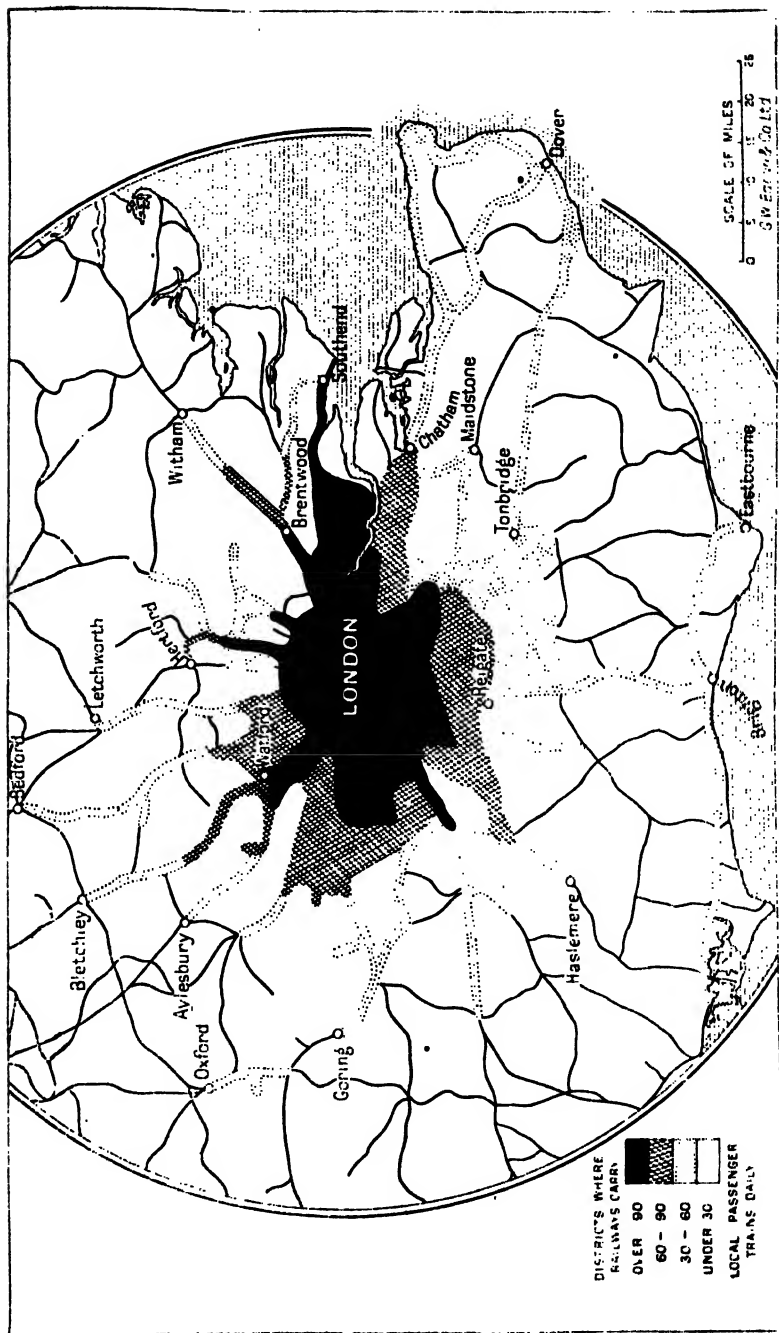


FIG. 55. Distribution of Local Passenger Traffic on Railways round London.

large towns. The map on p. 263 is an attempt to represent that traffic graphically. It illustrates the railways radiating from London within a radius of 60 miles from the centre of the city, the circle being broken at the north, and in order to admit the whole of the Kent coast. The small inner circle has a radius of ten miles from the centre, and is taken to represent urban London: on or about its circumference (only seen on the north) are situated Edgware, Barnet, Enfield, Chadwell Heath, Croydon, Kingston, and Southall. Omitting from consideration all goods trains, and all express passenger trains which stop less than thrice within the sixty-mile radius and serve places at considerable distances beyond it (and therefore cannot be regarded as performing purely local service), it is found that on each line there are definite points where a large number of local passenger trains from London stop, and whence a large number start to London. By plotting the number (or approximate number) of trains on each section of all the lines, it is possible to strike an average through all sections on which the requirements and conditions of service are broadly similar, and to arrange the sections in groups between which there exists a marked dissimilarity in respect of the number of local passenger trains run. These groups—four of which are shown here—take on the map something of a zonal form (as would be expected) surrounding the metropolis as a centre. The innermost (black) area on the map covers the circle of ten-mile radius, and beyond it those districts in which the conditions of local passenger traffic may be regarded as practically urban; on the lines serving these districts there are over 90 local passenger trains daily, and the average number is 120. Outside this zone there is an abrupt drop in the average to 70, and beyond this again there are further marked diminutions in the number of trains. It appears, therefore, that if the innermost zone represents practically urban conditions,¹

¹ In this connexion special notice may be taken of the influence of the Port of London, since 'practically urban conditions' are seen on the map to extend far down the Thames valley.

the next may be taken to represent suburban conditions. The third, then, will represent the outer residential districts and what may be termed holiday districts : it will be seen that the frequented parts of the south coast fall within this category, and it may be further noted that elsewhere it finds its greatest extension outward from the centre up the valley of the Thames (to Goring, &c.). The influence of the ' Garden City ' at Letchworth and of other distant places of residence for workers in London may be remarked as determining the outer limit of this zone. The map may therefore serve the incidental purpose of illustrating the vast range of the residential influence of London, but for our more immediate purpose it points the contrast between the ' density of traffic ' on railways in urban and in rural areas, for on the lines uncovered by a tint on the map the local passenger service has an average of only 20 trains daily, the range being from 30 down to 8. It may be added that these results are based upon week-day services in winter, but the effect is somewhat heightened by the inclusion of services which, on many lines serving residential districts and holiday resorts, are worked on particular days (such as Saturdays) when special requirements have to be met.

The railways of the United Kingdom are worked, as has been seen, by companies. The State has no share in the ownership or management, and in respect of her railways the mother-country thus differs, in a greater or less degree, from the oversea Dominions. There is in the United Kingdom no inconsiderable body of opinion in favour of the establishment of state ownership or ' nationalization ' of railways : the question of recent years has been brought forward in connexion rather with the serious disputes which have from time to time occurred between the managements and the employees, than with any particular consideration of advantage to the public service or finances. The opinion in favour of nationalization is said to be shared by not a few who are directly concerned with railway administration ; however this may be, and whatever view be taken as to the propriety or

Railway
adminis-
tration.

probability of so vast a change, it is a matter for profound gratification that it has not been made earlier in the history of railways. For it is easy to recall many refinements of railway service, making greatly for the public convenience, which have originated on British railways under the inspiring influence of severe competition—such influence as has no counterpart under the conditions of state working.

Board of
Trade and
Railway
and
Canal
Commis-
sion.

The construction of railways requires (under normal conditions) the sanction of an Act of Parliament. The Board of Trade is charged with the inspection of new railways, or new works on old railways, from the especial point of view of the public safety. A railway company must also advise the Board of all accidents of certain specified characters, including any accident whatever which results in loss of life or personal injury. The Board investigates such accidents, and arising out of its inquiries recommendations directed against the recurrence of the particular type of accident under consideration are frequently made: the Board has no power to enforce their execution; on the other hand, the company, although under this arrangement possessed of full discretion, cannot afford to disregard, even if it does not necessarily adopt, the views of the official inspector. The Board has certain powers of ruling in regard to the regulation of hours of labour on the railways, and to provisions for the safety of railway workers, and exercises intermediary functions in the event of disputes between the management and employees. The Railway and Canal Commissioners form a court for dealing, among other matters, with questions of rates and traffic, and with a company's neglect of or appeal against rules laid down by the Board.

Steam-
ship pas-
senger
services.

The chief English passenger seaports for distant countries are London, Liverpool, and Southampton. North American and South American traffic is shared principally between Liverpool and Southampton, Eastern and Australasian traffic principally between London and Liverpool; in African traffic all three ports have important shares. For passenger traffic Liverpool and Southampton serve as outports for London, many of the

steamship services from and to those ports having special railway services connecting with them from the metropolis, while for mail-carriage especially there are or have been similar arrangements in regard to certain overseas services (especially those from New York) at other ports—Queenstown in the south of Ireland, Fishguard, and Plymouth—whose more westerly position affords opportunity for the saving of a few hours by means of express trains. The chief oceanic port in Scotland is naturally Glasgow. Some of the North American lines call off Londonderry in the north of Ireland.

The principal Scottish, English, and Welsh ports for the Irish passenger traffic are Glasgow, Stranraer (for Larne only; this being the shortest passage between the two islands); Fleetwood, Heysham and Liverpool (principally for Belfast); Holyhead (for Dublin and Greenore); Fishguard (for Rosslare and Waterford). The south-coast ports for continental traffic are Dover (for Calais and Ostend), Folkestone (for Boulogne and Flushing), Newhaven (for Dieppe), and Southampton (for Havre and other French ports). The chief east-coast passenger ports are Harwich, Hull (together with Goole and Grimsby), Newcastle, and in Scotland, Leith, whence there are services to Antwerp and Hamburg, Norway and Sweden, the Faeroe Islands and Iceland, &c. Hull, Newcastle, and Grimsby are the chief English ports for the Scandinavian services.

A number of the great English railway companies have undertaken the working of steamship services and the ownership of docks—a natural development when the insular character of Great Britain and Ireland, the relation of the former to the continent of Europe, and the paramount importance of rail-distribution from the great ports are borne in mind. Thus, following the coasts from east by south to west, we find the North-Eastern Railway Company controlling docks at South Shields, the Hartlepool, Blyth, Middlesbrough, Hull, &c., and sharing in services from the port last named to Hamburg, Antwerp, and Ghent. The Lancashire and Yorkshire Company has

Railway,
steamship,
and dock
owner-
ship.

services from Goole to Hamburg, Belgium, and Dutch ports, and Dunkirk ; the Great Central, owning docks at Immingham and Grimsby, has services to Hamburg, Antwerp, and Rotterdam ; the Great Eastern from Harwich serves the Hook of Holland, Antwerp, &c. The South-Eastern and Chatham line works the Calais and Boulogne services, in addition to many trains in connexion with those to Flushing and Ostend. The London, Brighton and South Coast railway works the Newhaven-Dieppe service. The South-Western Company owns the docks at Southampton and runs steamers thence to Havre, St. Malo, Cherbourg, and the Channel Islands, the last being also served by Great Western steamers from Weymouth. Among the numerous Irish services, those from Fishguard to Rosslare and to Waterford are worked by the Great Western Railway, those from Holyhead to Dublin and to Greenore by the London and North-Western, that from Fleetwood to Belfast by the same railway jointly with the Lancashire and Yorkshire. The North-Western Company has also docks at Garston (Mersey). The Midland has docks at Heysham and services thence to Belfast and the Isle of Man. The Furness Company has docks at Barrow. The combination of railway and dock ownership is also found in connexion with the South Welsh coal-fields.

All the principal ports of the kingdom are connected by coastwise passenger steamers, and parts of the coast of the West Highlands of Scotland, in addition to the islands, are entirely dependent on such service.

Shipping. British sea-going merchant shipping,¹ with its total in the neighbourhood of 20,000,000 tons, exclusive of vessels of less than 100 tons, exceeds by more than four times in bulk that of the next mercantile marine power, Germany, and by eight times those of Norway and France. The superiority lies principally on the side of steamships ; the total tonnage of Norwegian merchant sailing-vessels, for example, is not very greatly less than that of British.

¹ For a general review of British and Imperial shipping, ports, &c., see the shipping number of *The Times*, Dec. 13, 1912, subsequently reissued in book-form (London, 1913).

The vast preponderance of British shipping belongs to the United Kingdom (and within that, to Great Britain); only about 0·09 per cent. of the total tonnage is owned in oversea Dominions.

London is the first of the ports of the United Kingdom Ports. in virtue of its vast import trade and in spite of the disability imposed upon it, in relation to modern shipping conditions, by its position high up an estuary. It is a great general market and warehouse port and distributing centre for imports, and of the immense British *entrepôt* trade London claims as much as all other ports in the kingdom. The shipping accommodation in the Port of London, as at Liverpool and Hull, consists principally of docks entered by lock-gates, which maintain the water within them at high-tide level, in contradistinction from open ports, like Glasgow. Liverpool commands the estuary of the Mersey, the gateway to the industrial district of south Lancashire. Cardiff is the leading port for the South Wales coal-field and manufacturing district; the Tyne ports (Newcastle and North and South Shields) are in a similar position in regard to the Northumbrian coal-field. Southampton, though not closely connected with any great industrial district, owes its eminence to its magnificent natural harbour and its central position, relative to London and other parts of England, on the coast of the English Channel. Hull, served by an important system of inland waterways converging on the Humber estuary, is in especial relation with the manufacturing district of the West Riding of Yorkshire. Bristol, a port of ancient fame, in some measure eclipsed under modern conditions owing to its position on the insignificant estuary of the Avon, has made efforts towards the regeneration of its trade by the development of an outport at Avonmouth and Portishead. With Liverpool may be grouped Birkenhead, facing it across the Mersey, and Manchester, whose ship-canal has withdrawn from Liverpool a large amount of trans-shipment from sea to land carriage or vice versa. Newport and Swansea group geographically with Cardiff;

Blyth and Sunderland with the Tyne ports, while the neighbouring port of Middlesbrough is specially identified with the Cleveland (Yorkshire) iron-field and its industries. With Hull are grouped Grimsby and Immingham near the mouth, and Goole near the head, of the Humber estuary. Glasgow and Leith are the chief Scottish ports, and Belfast and Dublin those of Ireland, though Belfast, famous though it is as a ship-building centre, takes a lower position as regards volume of commerce in the list of British ports than might be expected, even when the small proportion of Irish to British trade is borne in mind.

Inland
naviga-
tion.

It is not easy to conceive conditions under which a widespread system of river navigation existed in the British Isles, and, in England at any rate, was of greater value, to the districts which were so served, than the road system. It is hardly possible to conceive of systematic navigation carried on by a river of such impetuous character as the Wye—yet that river long carried an active traffic as high as Hereford—or by small tributary streams which are actually known to have been so used in various parts of the country. Large rivers, too, were navigable—though sometimes, no doubt, under grave difficulties—to a greater extent than would now appear possible, before the introduction of locks or any system of regulation: thus vessels of considerable size followed the Severn for 150 miles, up to Welshpool. River navigation was of first-rate importance from a very early period; those parts of the land where waterways fostered intercommunication and trade are frequently found to have possessed wealth and a standard of culture above those of districts lacking such facilities. It is not impossible still to find ocular demonstration of this: if, for example, ancient church architecture in England were to be broadly divided according to groups on a scale of elaboration and artistic standard, certain groups of high standard would undoubtedly be found to possess topographical relation with once important waterways. The fine churches of the Nene valley in Northamptonshire come easily to the mind; those of Waltham, Broxbourne, and others on the Lea

form another example, apart from any consideration of the valleys of the greater rivers. Valleys often form important natural highways even if their streams are not navigable, but it appears that rivers, with all their disadvantages of natural obstructions and tortuous courses, were preferred to bad roads or tracks, to an extent which, as has been said, is now difficult of realization. Under modern conditions the geography of a British seaport is studied in direct relation with the land-routes serving its hinterland: in earlier history it becomes appropriate to study the relation of certain seaports with inland waterways; and, as a further stage, that of river ports, higher up those water-ways, with land-routes. London focussed inland water-borne traffic not only on the Thames itself but on such tributaries as the Wey and the Lea, and we find agricultural produce transported by land-routes converging upon Godalming on the one stream and Ware on the other, and thence shipped to the capital. The Lea navigation must have been of particular importance; the first recorded Acts of Parliament for regulating the natural channel of a navigable river (1424, 1430) deal with it, and also the first which provided for the cutting of a new channel (1571). Other seaports of early importance in connexion with a hinterland served by navigable rivers are Bristol and the rivers of the Severn basin, King's Lynn and those draining into the Wash (the Bedford Ouse, Welland, and Witham), and Hull and the Humber system (including the Trent, the Yorkshire Ouse and tributaries). King's Lynn provides a marked example of declining relative importance in modern times, while the same tendency has affected Bristol as against its modern competitor, Liverpool, and other ports. The natural inland waterway has ceased in the British Isles to be a controlling geographical factor in the commercial eminence of a seaport.

From the later part of the seventeenth century onwards ^{Canals,¹ development.} it became a recognized practice not merely to regulate

¹ *Reports of the Royal Commission on Canals and Waterways*, London, 1906-11; E. A. Pratt, *British Canals*, London, 1906; J. E. Palmer, *British*

the natural channels of rivers, but to provide artificial channels where they would be found useful ; from this to the cutting of wholly artificial waterways—canals—was an easy transition, which took place in the second half of the eighteenth century. The corporation and certain merchants of Liverpool took powers in 1755 to connect the coal-fields about St. Helens with the Mersey by a canal following the valley of the Sankey Brook (for the improvement of the stream itself was found impossible), and in 1761 the Duke of Bridgwater opened the first canal with which his name and that of James Brindley, the engineer, were associated—that giving access to Manchester from his collieries at Worsley. The origin of English canals is therefore very intimately associated, as we have found the origin of railways to be, with the coal traffic, but before the end of the century their use for general commercial purposes came to be recognized, with the result that a great number were built. Among their promoters there were some who approached the problem of laying them out in a systematic spirit : the Grand Trunk Canal (opened in 1777) connecting the rivers Mersey and Trent, was expressly conceived as a trunk from which branches would extend into industrial areas where new lines of communication were needed. But for the most part the construction of English canals at this period was undertaken in a spirit more nearly parochial than national, as it might have been if any lead had been given by the Government. Many companies were formed ; they worked with an individual independence which is not easily realized at the present day when close interworking between transport companies is common ; in the result no standards in respect of depth, breadth, or other details of construction or organization were established. The opportunity for any such steps was really lost at the outset : when the rapidly developing railway system began, in and after the third decade of the nineteenth

Canals, London, 1910 ; H. R. de Salis, *Bradshaw's Canals and Navigable Rivers of England and Wales*, London, 1904 ; U. A. Forbes and W. H. R. Ashford, *Our Waterways : a History of Inland Navigation*, London, 1906.

century, to enter into serious competition with the canals, some efforts were made towards the standardization of the latter, but without great effect. It had been better for the canal system if its development had been delayed, and taken place *pari passu* with that of the railways : a better adjustment might then have been found between their respective spheres of utility. On the other hand the canals, in spite of any errors or shortsightedness which accompanied their construction, and in spite of the brevity of the period of their commercial ascendancy, did play a most important part in the industrial development of the century, before the railways superseded them.

But when the railways superseded them, they were left in the position that only a limited number retained any considerable economic utility, and that only for a certain class of traffic—the conveyance (mainly) of heavy imperishable goods, where rapidity is not a prime object. It must be added, however, that in many instances the canal companies, considering all the circumstances, were pretty well protected : railway companies were compelled to guarantee annual payments to some of the canal companies in compensation for prospective loss of traffic, or even to acquire their undertakings and assume obligations to maintain the properties. A number of canals, therefore, are now in the hands of railway companies, upon which they entail a large annual expenditure. A Royal Commission on Canals and Waterways, in 1909, worked out and advocated a practical selection and adaptation of existing routes, and the establishment of a standardized system of canals radiating from the Birmingham district and connecting with the Thames, Severn, Mersey, and Humber, under State ownership and control ; but it does not appear that an economic case was made out for a scheme so far-reaching. Not that the idea of improving the economic value of the inland waterway system has passed out of mind : when a general increase in railway rates for the carriage of various classes of merchandise was announced in 1913, the desirability of improving

Decline
and
present
condition
of canals.

water-communications, the introduction of motor-boats, and so forth, was immediately brought under discussion.

English
water-
ways.

In England (to which country the foregoing discussion principally applies) the inland waterways of any considerable commercial significance may be summarized as follows. Several canals and canalized rivers serving the industrial districts of eastern Lancashire and the West Riding of Yorkshire carry a fair traffic in coal, &c.—among these the Leeds and Liverpool Canal connects the western port with Blackburn and Burnley and joins the Aire and Calder Navigation, which runs from Leeds to Goole, the two thus making a waterway between the Mersey and the Humber. The river Trent carries some traffic, and is connected by the Trent and Mersey Canal with the Mersey, from near Burton and by way of the Potteries. The Shropshire Union Canal system is of some importance, and the river Weaver carries traffic between the salt-works of Cheshire and the Mersey. The Birmingham Canal Navigations, having connexions with the Severn and the Trent, as well as with other canals, are of importance to the mineral traffic of the Midlands. The Grand Junction Canal connects London with Leicester and the midland navigation system, and the Oxford Canal branches from it to the Thames at Oxford, up to which city that river itself carries a small commercial traffic. Among its tributaries, the Lea and Medway are of some importance for navigation. But in various parts of the country canals and river navigations are to be seen, either maintained barely in working order, or actually derelict.

Scottish
canals.

Scotland is without inland navigation almost entirely, save in the Clyde-Forth lowland, where canal-construction was geographically obvious, as it was also along the great fault which forms a natural highway athwart the Highlands, where the Caledonian Canal connects the lakes occupying the valley, and the western with the eastern sea. The Forth and Clyde navigation connects Bowling and Glasgow, on the Clyde, with Kirkintilloch, Falkirk, and Grangemouth on the Firth of Forth. With this canal is connected, at a point near Falkirk, the Union Canal to

INLAND WATERWAYS

Port Hopetoun, Edinburgh. There are certain minor branch canals, and all (except the Caledonian and Crinan Canals) are in the ownership of railway companies. Among a few canals which have been abandoned, the course of one, the Glasgow, Paisley, and Johnstone,

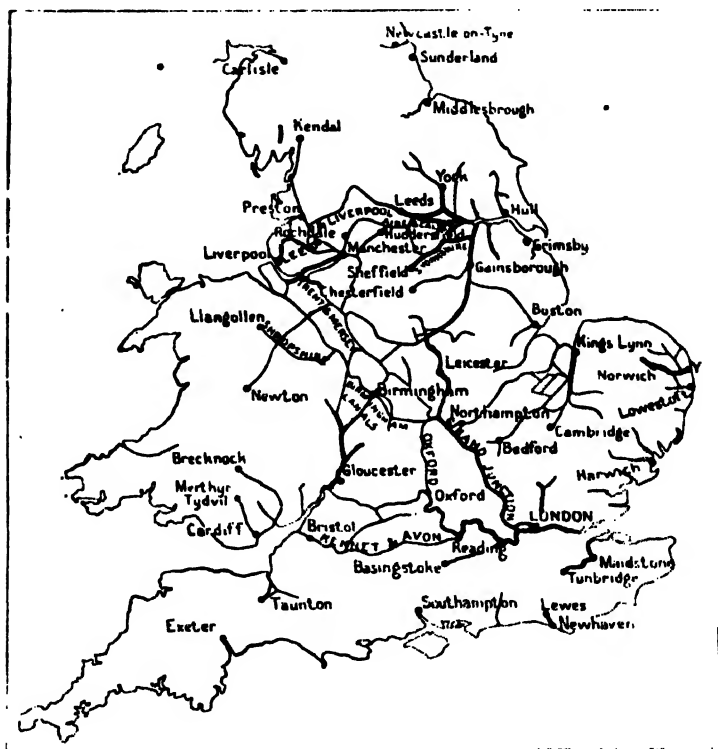


FIG. 56. Navigable Waterways of England and Wales.

became in part that of a branch of the Glasgow and South-Western Railway.

It has been stated elsewhere¹ by the writer of these lines that 'the navigable river and canal system of Ireland has never been developed as either nature or man intended. The Central Lowland, with its ramifying branches, gives ample opportunity for building canals to

Irish
water-
ways.

¹ *Geography of Ireland*, p. 216 (Oxford, 1911).

connect rivers which, owing to their usually gentle course through level country, needed only a little work to make them easily navigable. Early in the eighteenth century this opportunity for a complete system of waterways, natural and artificial, was fully understood; and not only so, but it was also seen that the digging of canals would also help in the drainage of bogs and the conversion of many useless and unhealthy wastes into fertile, habitable lands. Those who planned this scheme had before them, as a model, the drainage of the Fen country in eastern England, where vast tracts of marsh had been "reclaimed", or converted into dry lands, by the cutting of canals which at once drained them and served as waterways on which to carry their produce to market in boats. From 1730 to 1787 a body incorporated by Act of Parliament, and known as the Commissioners of Inland Navigation, made a beginning with the principal canal and river improvement works now existing in Ireland.' The enfeebled economic condition of Ireland gave the waterways even less chance here than elsewhere of success against railway competition, and there is now but a meagre traffic on most of them. The Shannon is navigable (with the assistance of a few stretches of canal passing rapids in the lower course) for 140 miles from its mouth. The Royal Canal from Tarmonbarry, by Mullingar, and the more important Grand Canal to the south, from Shannon Harbour, by Tullamore, connect the Shannon with Dublin. From the latter there is a connexion to Athy, on the river Barrow, which gives access to Waterford. In Ulster the river Barrow is navigable from Lough Neagh to its mouth, and the Lough is connected eastward by canal and the river Lagan with Belfast. There is a small ship canal from Newry to Carlingford Lough, and there are several shorter or detached lengths of waterway elsewhere in the island, which need not be detailed.

Ship
canals.

Ship canals in Scotland and Ireland have been named above; in England the Berkeley Canal from Gloucester to a point on the Severn estuary, and the far more important

Manchester Ship Canal, must be mentioned here. The Manchester Ship Canal gives access from the Mersey estuary to that city, where the great cotton and other warehouses may thus be stocked and cleared without the necessity of transshipment at Liverpool and of land-carriage.

During their occupation of Britain, the Romans constructed an extensive system of highways, as was their custom in their conquered provinces. These roads were in most cases of extremely solid construction, and joined together all the larger centres of population by the most direct route possible. During a large part of the long period after the departure of the Romans, when there was no systematic control or development of the road system at all, these Roman highways continued in use. The demands made on the roads were comparatively small during the Middle Ages, so that the care of the Church, which made a pious work of attention to all the needs of travellers, and the charitable gifts of the wealthy, sufficed to keep the roads in as satisfactory a state as was demanded. But after the great expansion of trade during the sixteenth century, they became so entirely inadequate to the demands made on them that some legislation on the subject was imperatively necessary. An Act was therefore passed under Queen Mary in 1555, placing the care of the roads on the parish, and directing that each year the poorer inhabitants were to devote four days to labour on the public roads, and the land-owners were each to send a cart with men and tools. A surveyor of the highways was appointed in each parish to see that these duties were satisfactorily carried out. With various alterations this system of forced labour for the maintenance of the roads, inadequate as it obviously was, lasted till it was ousted from the main roads by the turnpikes in 1835. To alleviate the difficulties and dangers caused by the state of the roads, which seem to have become worse and worse during the seventeenth and early part of the eighteenth centuries, the Government had recourse to legislation directed not towards the

improvement of the roads themselves, but towards the lightening of the strain put upon them by the traffic. A mistaken theory grew up, that broad wheels on carts would tend to consolidate and strengthen the road-surface, and was embodied in various arbitrary Acts of Parliament, and caused much trouble and inconvenience, besides in all probability rendering the roads even worse than before.

The turn-
pike and
coaching
period.

The state of the roads began at last to improve with the adoption of the system that the users of the roads should pay for them, by means of the gradual setting up of turnpikes and the formation of turnpike trusts all over the country. This, coinciding as it did with the development of the great coaching industry, caused a vast relative improvement in the condition of the main roads, though they were still very unsatisfactory in most parts of the country, in spite of the amount of attention given to the subject and the large sums of money expended.

It was not until scientific road-making, as practised by Telford and McAdam, had come to the fore, that the roads really reached their most perfect state. The short period in which the roads were at their best, and in which the greatest demands were made on them by the numerous coaches of the day, lasted only for about twenty years, from 1820 onwards. Then the irresistible competition of the railways began gradually to force the coaches off the road. The turnpike system was becoming full of abuses and was felt to be very inadequate, and the 'Statute labour' as supplied by the parish, was almost farcical.

Modern
road con-
trol.

The Act passed in 1835 left the task of maintaining its own roads to each separate parish, but provided for voluntary combination between parishes to form highway districts. Hardly any were actually formed owing to the mutual jealousies between neighbouring parishes, and up to 1862 numerous plans were made and bills brought in to improve the local system of road maintenance. In the first half of the century marked improvements had been effected in the Scottish roads after the formation of Road Boards in that country. just as in Ireland improvement had followed upon the appointment of the grand juries

as road authorities in 1763. In 1802 a Highways Act was passed allowing the compulsory formation of highway boards by the justices of the peace, but the opposition was so strong that this arrangement was never completed. The solution was at last reached with the establishment of the Local Government Board, which, by exercising general supervision over the local authorities, brought the road system nearer to the position of a directly national concern than it had been since the Roman period. By the end of the nineteenth century road administration had at last been taken completely out of parochial hands. Since the abolition of turnpikes and the passing of the Local Government Act, 1888, the main roads have passed under the control of the county councils, the secondary roads are administered by the rural district councils, and those in towns by the municipal or urban district councils.

The application of mechanical traction to road vehicles introduced new problems in connexion with the maintenance and amenities of the road, or revived old ones (such as the 'dust nuisance') which had been left unsolved in the coaching era, and these and the excessive expenditure imposed upon the local authorities by the vast accretion of traffic led to the establishment in 1910 of the Road Board,¹ entrusted with the expenditure of funds derived indirectly from users of the road by means of duties upon motor-spirit and motor-car licences. This board is empowered to advance money to local authorities for the construction of new roads and the improvement of existing roads, or may itself construct new roads, and it also conducts researches into methods of road construction and maintenance. Users of motor-cars have formed numerous organizations, among which may be mentioned the Royal Automobile Club, the Automobile Association and the Motor Union, which are able to render valuable service in collaboration with road authorities in respect of the improvement of the conditions of traffic and its control, and at the same time to protect the interests

¹ See chapter on Public Administration, below.

On inland transport generally, see E. A. Pratt, *A History of Inland Transport and Communication in England*, London, 1912

(which have not been without need of protection) of an important section of those who use the road.

CHAPTER X

POPULATION¹

DISTRIBUTION AND RELATIVE DENSITY

BY PROFESSOR A. L. BOWLEY

Total
popula-
tion :
condi-
tions of
census.

THE population of the British Isles, as enumerated on the night of Sunday, April 2, 1911, was 45,370,549 persons, of whom 34,045,290 were in England, 2,025,202 in Wales, 4,760,904 in Scotland, 4,390,219 in Ireland, 52,034 in the Isle of Man, and 96,900 in the Channel Islands. These numbers include all persons enumerated in houses or buildings, travelling on the roads, in sheds or caravans, afloat in ports or arriving on April 3. They do not include other fishermen or sailors or the army abroad. The census affords an instantaneous picture of the numbers of persons where they happened to be, without reference to their ordinary place of living or livelihood. The date, however, is so chosen that few people are away for pleasure, and not many on business, so that the great majority are allotted to their ordinary Sunday place of residence. It should be noted the sea-side and pleasure resorts in most cases only contained their permanent population, and that Oxford and Cambridge Universities were in vacation.

¹ The statistics of this chapter are in all cases taken from the reports on the census of 1911.

Throughout the chapter areas are printed in *italic type* (2,347), population in *small clarendon type* (747), and density in *small figures*. The units used are, for areas 1,000 acres, for population 1,000 persons, and for density number of persons per 100 acres; but in the case of urban districts the density is generally given to the nearest hundred. Thus: Middlesbrough (18, 105, 600), and Easingwold (74, 10, 14), means that the areas of Middlesbrough (county borough) and Easingwold (rural district) were 18,000 and 74,000 acres (to the nearest thousand); the populations enumerated on April 2, 1911, were 105,000 and 10,000 (to the nearest thousand); and the densities 600 persons per 100 acres and 14 persons per 100 acres (to the nearest hundred or unit) respectively.

Of the various classes of areas for which the population is stated separately, administrative districts seem to be the most suitable for the study of density. England and Wales are divided into 62 administrative counties,¹ and 75 county boroughs which are associated with the counties.² Each county is divided into urban districts³ (including municipal boroughs) and rural districts. The smaller divisions (wards and civil parishes) will not be used. The areas are those at the date of the census, except in the cases of Bath, Birmingham, Cambridge, Christchurch, Reading, Tilbury, and Tynemouth (R. D.), where the altered boundaries up to April 1, 1912, are used.

Taking first the spatial distribution of population, we have :

	Area, thousands of acres.	Population, thousands.	Density per 100 acres.
<i>South of the Thames and Bristol Avon—</i>			
Cornwall, Devon, Somerset, Dorset, Wiltshire	5,067	1,096	30
Isle of Wight, Southampton, Berks., Surrey, East and West Sussex, and Kent	3,886	3,776	97
<i>Middlesex and County of London</i>	224	5,648	2,500
<i>South of the Wash and East of Bedford—</i>			
Essex, East and West Suffolk, Norfolk, Peterborough, Hunts., Cambridge, Ely	4,684	2,542	62
<i>From the Usk to the Nen and north of the Thames—</i>			
Monmouth, Gloucester, Oxford, Bucks., Herts., Beds., Northants	3,408	2,360	69
<i>Wales</i>	4,778	2,025	42
<i>Other counties south of the Mersey and Humber—</i>			
Hereford, Salop, Worcs., Staffs., War- wick, Leics., Rutland, Lincoln, Notts., Derby, Cheshire	7,388	6,578	89
<i>North of the Mersey and Humber—</i>			
Lancs., Yorks., Westmorland, Durham, Northumberland, Cumberland	8,504	11,144	131
England and Wales	37,338 ⁴	36,070	97

¹ Hampshire is divided into the Isle of Wight and the county of Southampton; Lincolnshire into the parts of Holland, Kesteven, and Lindsey; Yorkshire into three Ridings; the Isle of Ely and the Soke of Peterborough are separated from Cambridge and Northants; and Suffolk and Sussex are each divided into East and West.

² The city of York is in the sequel taken as associated with the East Riding.

³ The county of London consists of 29 metropolitan boroughs (including the City of London).

⁴ The areas include inland waters.

North
and
south
division
of area
and popu-
lation
(England).

If a line is drawn from the Wash to the north of Monmouthshire, so as to leave the counties of the last two groups to the north of it, very nearly one-half of England (excluding Wales), would lie to the south (16,669, 16,322, 98), and half to the north (15,892, 17,722, 112), whether we consider area or population.

(Classifi-
cation of
popula-
tion.

The aggregation of the population may be considered under the classification of : great cities, with or without their dependent suburbs ; large towns ; other industrial districts, mining and quarrying districts ; and rural districts, with or without the market towns depending on them.

Great
cities.

London (administrative county : 75, 4,522, 6,000) may be divided into an inner ring of 20 municipal boroughs (32, 2,988, 9,200) in which the population has decreased since 1901, and an outer ring of 9 municipal boroughs (42, 1,534, 3,650) in which the population has increased. Associated with London and dependent upon it economically are many small towns and scattered districts in the surrounding counties, of various sizes and densities (538, 2,961,¹ 550) according to the classification given in Table II below), which make the whole 613, 7,483, 1,220.

Liverpool (county borough : 17, 746, 4,500) may properly be considered to be united to Birkenhead (4, 131, 3,700) and numerous other industrial and residential districts in Lancashire and the Wirral peninsula, which raise the total to 46, 1,120, 2,400.²

Manchester (county borough : 22, 714, 3,200) and Salford (5, 231, 4,500) must be taken together (27, 946, 3,500), and with them are associated many districts which cannot be separated from the cotton district as a whole.

Birmingham was extended on April 1, 1912 (44, 840, 1,900), to include the neighbourhood most closely associated, but in fact it can hardly be separated from the metal and coal districts of Staffordshire. Similarly

¹ The classification in the census report gives 2,730,000 in the outer ring.

² Excluding Wirral rural district ; otherwise as classified below.

Sheffield (24, 460, 1,900) and Leeds (22, 446, 2,100) are involved with surrounding urban districts.

The remaining cities with a population of more than 200,000 were Bristol (17, 357, 2,000), Bradford (23, 288, 1,300), Hull (9, 278, 3,100), Newcastle-upon-Tyne (8, 267, 3,100), Nottingham (11, 260, 2,400), Stoke-on-Trent (11, 235, 2,100), Portsmouth (6, 231, 3,800), Leicester (9, 227, 2,600), and the 'Three Towns', Plymouth, East Stonehouse, and Devonport (6, 207, 3,600). The 16 great cities, without the outer rings of London or Liverpool account for a population just over 10,000,000 with an aggregate density of 33 to the acre.

There are 58 towns in the aggregate (327, 4,976, 1,600) ^{Large town} whose population was between 50,000 and 200,000, of which 9 are in the southern counties, 7 in the eastern, 9 in the midland, 19 in Lancashire or the West Riding, 9 in the northern counties, 4 in Glamorgan, and 1 in Monmouth.

In all 18,500,000, or just over half the population of England and Wales, were enumerated in towns whose population was over 50,000, or in the outer ring of London.¹

In towns or urban districts whose population was between 20,000 and 50,000 (excluding the outer ring of London) there were about 3,500,000 persons, but it is better to classify these in a different way.

The distinction between administrative urban and administrative rural districts is technical. Urban districts are constituted as such by the Local Government Board, and are obliged to undertake some, and may undertake others, of the duties of public services and of erecting public buildings, which are necessary or expedient in relatively dense districts. For rural districts many of these services are not provided or are administered by the county councils. At the date of the census there were 325 boroughs (including the county of London as one) and 810 other urban districts; of these, all but 155 had a density of more than 1 per acre, and

In industrial, mining, or manufacturing districts.

¹ The urban district of Rhondda is not included.

all but 66 a density of more than 50 per 100 acres. On the other hand, of 654 rural districts only 29 had a density of over 1 per acre, while 59 others had a density between 50 and 100 per 100 acres. Thus in the main the line dividing urban and rural districts is the same as that dividing districts of a density greater than 1 from the less dense. The more closely populated rural districts are either in the neighbourhood of London, or contain suburbs of large towns, or are intermixed with the urban districts of the main industries as classified below, in which case the same industries are carried on in the rural districts, or they contain mines or quarries, or definite minor industries are carried on in them. In these respects they resemble the less dense urban districts, which are in most cases either suburban or surrounded by dense industrial neighbourhoods or are scattered mining and quarrying districts; in a few instances they contain small industrial nuclei which are administered with small districts of the surrounding county.

Urban and
rural dis-
tricts.

In the first of the following tables are included all the boroughs and other urban districts (except three which seem to have no urban character) together with 29 rural districts which are, at any rate in part, distinctly of an urban or industrial character. In the second table the remaining¹ rural districts with a density of over 50 are added to the categories to which their prevailing non-agricultural industry entitles them. By this process a good deal of rural population is carried over to the industrial population, while a good deal of industrial population, whether in mines or quarries or industrial villages, remains classified, as rural, and consideration of the third table suggests that these two groups are not far from equal. In any case the line drawn must be in some measure arbitrary.

Rural dis-
tricts and
market
towns.

In the third table is shown the effect of associating with the rural districts 346 market towns with populations less than 30,000. The great majority of these depend for their economic existence to a large extent on the

¹ Except 8 which are not readily classified.

surrounding country. It is thought that what industrial or other non-rural importance these towns possess may be set against the rural or marketing element in the larger or more definitely industrial towns; but the effect of different hypotheses is shown in the following numbers:

Various Methods of Measuring the Rural and Industrial Population.

	<i>Industrial.</i>			<i>Rural.</i>		
Urban districts including boroughs as in census	4,030	28,290	700	33,310	7,780	23
Effect of transferring 29 rural and 3 urban districts as in Table I	4,600	28,930	630	32,740	7,140	22
Effect of transferring 52 more rural districts as in Table II	6,070	30,100	500	31,270	5,970	19
Effect of further transferring to rural districts market towns—						
(1) population less than 20,000	4,960	28,280	570	32,350	7,790	24
(2) " " " 30,000 ¹	4,950	28,030	570	32,390	8,040	25
(3) " " " 40,000 ²	4,940	27,850	500	32,400	8,220	25
(4) " " " 50,000 ³	4,930	27,670	500	32,410	8,410	26
(5) four larger market towns	4,890	27,450	500	32,450	8,620	27
(6) also Colchester, Derby, Ipswich, Reading, and York	4,850	27,040	500	32,490	9,030	28

Thus the rural population without the associated market towns is about 6,000,000 with a mean density of 19 per 100 acres, and with them is about 8,000,000 with a mean density of 25 per 100 acres.

If a density map of England and Wales is studied, the reasons for the classifications of Tables I and II at once become evident. The aggregation of London has influence over an area about 15 miles in radius. There are large densely populated regions in Glamorgan and Monmouthshire, in the district from Birmingham stretching 20 miles to the north-west, and at Stoke-on-Trent. A great curve beginning in North Leicestershire, passing through Nottingham and East Derbyshire to Sheffield, broadening to include the West Riding, and then passing

Distribution of population.

¹ Between 20,000 and 30,000 Canterbury, Hereford, Salisbury, Shrewsbury, Winchester, Gainsborough, Grantham, Guildford, Rugby, Stafford, Taunton.

² Between 30,000 and 40,000 Chester, Peterborough, Bedford, Doncaster, Maidstone.

³ Between 40,000 and 50,000 Carlisle, Exeter, Worcester, Lancaster.

⁴ Gloucester, Lincoln, Oxford (including Headington R.D.), Cambridge.

westward to include South Lancashire and North Cheshire, passes through a continuously densely populated country. A further dense district extends near the coast from south of the Tees to north of the Tyne. The districts thus enumerated are classified under main industries and coal-fields. Right round the coast are numerous large and small nuclei of population which are classified as dock-yard ports, fishing towns or seaside resorts. Here and there scattered throughout England are isolated industrial towns. When all these are accounted for, there remain throughout England south of York towns of 3,000 to 30,000 persons, that make an approach to a uniform pattern on the map, separated one from another by a distance of 10 to 20 miles; these are the market towns.

In the majority of cases there was little doubt as to the classification; in some the towns had more functions than one, and were allotted to that which seemed most important. The areas named as coal-fields contain a good deal of rural district, and in many cases iron and other metal manufactures; on the other hand, coal is distributed widely under several of the areas classified as main industries. The classification is bound to be somewhat arbitrary, and it is therefore necessary to study the classified lists with the tables.

Areas of
densest
popula-
tion.

The industrial districts (including mines, but not ports) in the north midland and the north¹ account for about 12 million persons out of nearly 15 million in the country as a whole. Bristol, Norwich, Leicester, and Northampton and neighbourhoods account for about another million, and the South Wales coal-field for not much less than another. This leaves very little in the agricultural counties of the south, the east, and Wales and its borders. On the other hand, this latter group includes the great bulk of the population classed under seaside and under market towns, in fact over three-quarters of each group. Taking the whole of Table 1 we find half the industrial

¹ Shropshire has very little industry, resembling Herefordshire, and is classed in the non-industrial west midlands.

Table I.—Boroughs and other Urban Districts.¹—England and Wales.
(Thousands of acres; thousands of persons.)

Regions. ²	London.	Main Industries.	Isolated Industries.	Fishing, Ports, and Dockyards.	Coal Districts.	Other Mines and Quarries.	Residential, Seaside, and Health Resorts.	Market, Military, and Cathedral Towns.	Totals.									
South-west	111	672	7	64	20	261	5	11	20	42	75	318	143	300	276	1,086		
South-east			34	171	45	696			78	665		123	434		391	2,638		
London and Middlesex	224	5,648													224	5,648		
South and West Midlands	22	110	66	880			14	38	4	13	11	60	213	543	330	1,653		
East	57	860	27	239	21	185					41	178	300	525	446	1,987		
North Midland, Lancs., and West Yorks.		<div><div>Birmingham and Black Country</div><div>140</div><div>1,613</div></div> <div><div>Potteries</div><div>26</div><div>300</div></div> <div><div>Lancs.</div><div>30</div><div>355</div></div> <div><div>Wood district</div><div>314</div><div>1,572</div></div> <div><div>Cotton "</div><div>459</div><div>3,493</div></div> <div><div>Sheffield district</div><div>90</div><div>661</div></div>	48	674	53	1,168	259	873	12	9	57	203	105	420	1,623	11,449		
North		<div><div>Tyneside and north-east coast</div><div>28</div><div>724</div></div> <div><div>Newcastle dis. tract</div><div>13</div><div>326</div></div>	10	100	24	350	441	871	31	43	34	82	109	103	691	2,779		
Monmouth and Glamorgan			10	44	13	44									6	8		
Wales (rest of)															17	14		
Totals	414	7,200	1,110	9,053	263	2,262	263	3,140	1,112	2,711	90	121	362	1,666	1,112	2,661	4,596	28,934

¹ Together with 29 rural districts (522, 667), viz. 4 to London (48, 48), 2 to Black Country (11, 47), 1 to Potteries (3, 5), 1 to Lacc (5, 10), 3 to Wood (16, 18), 4 to Cotton (15, 30), 1 to Sheffield (35, 33), and 13 to Coal (441, 457); and omitting 3 small urban districts, Baslow, Lathom, and Preshall (22, 10).

² Contents of Regions: South-west.—Cornwall, Devon, Somerset, Dorset, Wilts., *South-east*.—Isle of Wight, Hants, Berks., East and West Sussex, Surrey, Kent, South and West Midlands.—Herts., Beds., Bucks., Leics., Rutland, Northants, Oxford, Glouce., Hereford, Shropshire. *East*.—Essex, East and West Suffolk, Norfolk, Cambs., Isle of Ely, Hunts., Soke of Peterborough, and Lincs. (the three parts). *North Midland*.—Worcester, Warwick, Stafford, Cheshire, Derby, Notts. *North*.—Yorks. (East and North and City), Durham, Northumberland, Cumberland, Westmorland. Administrative counties in all cases.

and urban population in the north midland and the north, and one-quarter in or near London; the remaining quarter is scattered through England or concentrated in the coal-fields and coast of South Wales, or in the southern ports and dockyards. These statements need very little modification to be applicable to Table II, and hence it may be presumed are little affected by the method of classification.

Contents of Columns in Table I.

(Boroughs or urban districts, as in the 1911 census, unless otherwise stated.)

London.—Whole of administrative counties of London and of Middlesex: Merton, Wimbledon, Barnes, Richmond, Ham, Kingston, Malden, Surbiton, Molesey, Esher, Weybridge, Walton, Chertsey, Egham, Woking, Epsom, Carshalton, Sutton, Croydon, Caterham, Reigate; Penge, Beckenham, Bromley, Chislehurst, Foot's Cray, Bexley; Waltham Cross, Epping, Loughton, Walthamstow, Buckhurst Hill, Woodford, Chingford, Leyton, Wanstead, West and East Ham, Barking, Ilford, Romford; East Barnet, Barnet, Hoddesdon, Bushey, Watford, Rickmansworth, Cheshunt, Slough.

Main Industries.—*Birmingham and Black Country*: Birmingham (as in 1912), Dudley, Lye and Wollescote, Stourbridge, Oldbury, Bromsgrove, North Bromsgrove; Sutton Coldfield; Tottenhall, Wolverhampton, Heath Town, Wednesfield, Short Heath, Willenhall, Walsall, Darlaston, Bilston, Cosely, Sedgley, Rowley Regis, Tipton, Smethwick, West Bromwich, Perry Barr, Wednesbury, Amblecote, Quarry Bank, Brierley Hill, and *rural districts* of Halesowen and Kingswinford. *Potteries*: Newcastle-under-Lyme, Stoke-on-Trent, Smallthorne, Kidsgrove, Wolstanton, and Stoke *rural district*. *Lace*: Nottingham, Arnold, Carlton, West Bridgeford, Hucknall Torkard, Beeston, Long Eaton, and Stapleford *rural*. *Wool*: the whole of the *registration districts*¹ of Keighley, Todmorden, Saddleworth, Huddersfield, Halifax, North Bierley, Bradford, Bramley, Leeds, Hunslet, Holbeck, and Dewsbury (except Todmorden and Keighley *rural districts*), together with the urban districts of Garforth, Burley, Baildon, Guiseley, Horsforth, Otley, Rawdon, and Yeadon. *Cotton*: all the urban districts of Lancashire from Clitheroe southwards, except those otherwise tabulated in this list; the *rural districts* of Leigh, Barton, Limehurst, and Bury in Lancashire; Glossop, New Mills, and Belper in Derbyshire; Barnoldswick and Earby in Yorkshire; and Stockport, Marple, Hyde, Hazelgrove, Handforth, Compstall, Cheadle, Bredbury, Alderley Edge, Bollington, Yeardsley, Altrincham, Ashton-on-Mersey, Bowdon, Hale, Knutsford, Lymm, Sale, Wilmslow, Stalybridge, Dukinfield, Hollingworth, and Mottram in Cheshire. *Sheffield district*: Sheffield, Rotherham, Handsworth, Mexborough, Greasbrough, Rawmarsh, Swinton, Wath, Bolton-upon-Deane, Balby, Bentley, Thurnscoe, Wheatley, and Rotherham *rural district*. *Tyneside and North-east Coast*: South Shields, Jarrow, Hobburn, Felling, Gateshead, Southwick, Sunderland, Seaham, Hartlepool, West Hartlepool, Middlesbrough, Ormesby, South Bank, Thornaby. *Newcastle district*: Newcastle-upon-Tyne and Tynemouth.

¹ With slight rectification of boundaries to include whole urban districts.

Isolated Industrial Districts.—Hayle, Trowbridge, Swindon, Eastleigh, Reading (1912), Lydd, Ashford, Dartford, Erith; Luton, High Wycombe, Hinckley, Leicester, Shepshed, Wigston, Loughborough, Higham Ferrers, Kettering, Northampton, Irthlingborough, Wellingborough, Witney, Bristol, Kingswood, Nailsworth, Stroud; Colchester, Ipswich, Norwich, Droitwich, Redditch, Stourport, Bewdley, Kidderminster, Coventry, Burton, Leek, Macclesfield, Runcorn, Crewe, Congleton, Northwich, Derby, Alvaaton; St. Helens, Widnes, Warrington; Darlington, Stockton, York, Llanelly, Burry Port, Kidwelly, Connah's Quay.

Fishing, Ports, and Dockyards.—Padstow, St. Ives, Paul, Falmouth, Devonport, East Stonehouse, Plymouth, Brixham, Portland, Lymington, Itchen, Southampton, Gosport, Portsmouth, Shoreham, Newhaven, Folkestone, Dover, Deal, Sheerness, Queenborough, Gillingham, Chatham, Rochester, Northfleet, Gravesend, Tilbury (1912), Leigh, Harwich, Yarmouth, King's Lynn, Grimsby, Barton-on-Humber, Goole, Hull, Bridlington, Blyth, Amble, Berwick; Maryport, Heysham, Fleetwood, Lytham, Holyhead, Ynyscynhaiarn, Aberaeron, Fishguard, Milford Haven, Neyland, Pembroke, Swansea, Porthcawl, Barry, Penarth, Cardiff, Newport, Chepstow. *Liverpool and vicinity*, viz. Liverpool, Bootle, Great and Little Crosby, Waterloo, Litherland, Allerton, Childwall, Much and Little Woolton, Huyton, Prescot, Birkenhead, Wallasey, Bromborough, Higher and Lower Bebington, and Neston.

Coal.—Radstock, Midsummer Norton. In *Leicestershire*: Ashby de la Zouche, Ashby Wolds, Coalville. In *Derbyshire*: Swadlincote, Heage, Ripley, Heanor, Ilkeston, Alfreton, Clay Cross, Chesterfield, Brampton, Whittington, Drontfield, Bolsover. In *Nottinghamshire*: Workop, Warsop, Mansfield-Woodhouse, Mansfield, Huthwaite, Kirkby, and Sutton-in-Ashfield, Eastwood; Nuneaton, Bulkington; Cannock Chase, Brown Hills, Biddulph, Audley; Oakengates; Skelmersdale, Barrow, and Dalton-in-Furness. In *Cumberland*: Millom, Harrington, Egremont, Whitehaven, Cleator Moor, Arlecdon, Workington, Cockermouth, Aspatria, Holme Cultram, Wigton. In *Northumberland*: Ashington, Newbiggin, Bedlington, Gosforth, Newburn, Cranlington, Earsdon, Seghill, Walkend, Weetslade, Whitley and *rural district* of Tynemouth. The whole county of *Durham* except the *rural districts* of Sunderland, Darlington, Hartlepool, Stockton, Barnard Castle and Weardale, and the urban districts otherwise tabulated in this list. In *Yorkshire* (West Riding) the *registration districts* of Wakefield, Pontefract, Barnsley, Hemsworth, and Penistone, except the *rural districts* of Barnsley, Penistone, and Pontefract. In *Monmouth and Glamorgan*, all urban districts other than ports, Caerleon, Usk, Abergavenny, Monmouth, Bridgend, and Cowbridge, together with the *rural districts* of Neath, Llantrisant, and Pontardawe; Ammanford, Brynmawr, Wrexham.

Other Mines and Quarries.—Redruth, Camborne, Phillack, St. Just, Ludgvan, St. Austell; Wirksworth, Bonsall, North and South Darley; Rushden, Guisborough, Eston, Loftus, Skelton; Ffestiniog, Bethesda.

Residential, Seaside, and Health Towns.—Portishead, Clevedon, Weston, Burnham, Watchet, Minehead, Lynton, Ilfracombe, Northam, Newquay, Penzance, Madron, Looe, Torpoint, Salcombe, Dartmouth, Paignton, Torquay, Teignmouth, Dawlish, Exmouth, Budleigh Salterton, Sidmouth, Seaton, Lyme Regis, Weymouth, Swanage, Poole, Bournemouth, East and West Cowes, Ryde, St. Helens, Sandown, Shanklin, Ventnor, Bognor, Littlehampton, Worthing, Southwick, Portslade, Hove, Brighton, Seaford,

Eastbourne, Battle, Bexhill, Hastings, New Romney, Sandgate, Cheriton, Hythe, Walmer, Ramsgate, Broadstairs, Margate, Herne Bay, Whitstable, Southend, Shoeburyness, Burnham, Brightlingsea, Clacton, Frinton, Walton-on-the-Naze, Felixstowe, Aldeburgh, Southwold, Lowestoft, Oulton Broad, Cromer, Sheringham, Hunstanton, Skegness, Mablethorpe, Cleethorpes, Withernsea, Hornsea, Filey, Scarborough, Whitby, Hinderwell, Saltburn, Redcar; Morecambe, Poulton, Thornton, Blackpool, Bispham, St. Anne's, Kirkham, Southport, Birkdale, Formby; Hoylake, Prestatyn, Rhyl, Abergelle, Colwyn Bay, Llandudno, Conway, Penmaenmawr, Llanfairfechan, Beaumaris, Menai Bridge, Griccieth, Bettws-y-Coed, Barmouth, Towyn, Aberystwyth, New Quay (Cardiganshire), Tenby, Oystermouth.

Windsor, Eton, Maidenhead, Marlow, Henley.

Tunbridge Wells, Fleet, Bath (1912), Cheltenham, Charlton Kings, Leamington, Malvern, Buxton, Fairfield, Matlock, Matlock Bath, Church Stretton, Woodhall Spa, Ilkley, Harrogate; Ambleside, Grasmere, Windermere, Grange; Llangollen, Bala, Builth and Llandrindod Wells, Llanwrtyd.

Military.—Aldershot and Frimley.

Market or Cathedral Towns.—The 359 remaining urban districts.

The rural
popula-
tion.

Taking rural districts as the units, and excluding those dealt with in Table II, we find as in Table III that half the rural area of Wales (excluding Glamorgan) and nearly half of that of the northern counties carry a population with a density less than 10. On a map these districts correspond closely to those of mountain and moor, as do the similarly sparse districts in the West Riding and Lancashire. The moorland and downs of the south are relatively small, and are so generally appropriated to populous parishes on their edges that the areas taken as units seldom show a density below 10. Of the whole rural area 43 per cent. carries a population with density between 10 and 20; this includes the remaining parts of Wales and the north (with an insignificant residuum), nearly half the east (of which much is in the Fen country), nearly half the west and south midland (much more than half of Herefordshire and Shropshire), and three-fifths of the south-west, where there are few dense districts. The districts whose density is from 20 to 30 account for 28 per cent. of the rural area. This includes half the north midland group (much more than half Derbyshire, Worcestershire, and Warwickshire). It is also the typical density for Cambridgeshire (outside the Fens) and East Anglia, and of Suffolk. The districts with a density from 30 to 50 account for a great part of Staffordshire, Hertfordshire,

Table II.—Boroughs and other Urban Districts and Dense Rural Districts¹—England and Wales.
(Thousands of acres : thousands of persons.)

Regions.	London.	Main Industries.	Isolated Industries, Dockyards.	Fishing, Ports, and Harbours.	Coal Districts.	Other Mines and Quarries.	Residential, Resorts, and Towns.	Market, Military, and Civilian.	Totals.										
South-west London	208	708	7	64	20	261	5	11	116	98	75	318	143	300	366	1,142			
South-east London			72	211	74	720					110	693	178	471	642	2,863			
Middlesex																			
South and West Midlands	94	151	158	951			96	87	4	13	11	69	239	556	602	1,827			
East	87	885	27	230	23	186					41	178	300	525	478	2,013			
North Midland, Lancs., and West Yorks.			Birmingham and Black Country	152	1,624														
			Potteries	26	300														
			Lace	74	386	1,135	730	90	1,187	647	1,166	12	9	57	293	105	420	2,212	11,000
			Wool district	322	1,579														
			Cotton "	392	3,518														
			Sheffield district	90	661														
North			Tyneside and north-east coast	45	207	24	350	441	871	31	43	34	82	109	103	732	2,825		
			Newcastle	35	753														
				13	320														
Monmouth and Glamorgan																			
Wales (rest of)				123	512	400	907	63	94	17	14	64	85	111	120	278	401		
Totals	613	7,482	1,214	9,156	454	2,455	377	3,260	1,652	3,136	189	177	394	1,724	1,193	2,711	6,067	30,101	

¹ Viz. to London : rural districts of Chertsey, Epsom, Croydon, Bromley, Eton, Watford, Romford (199, 192). Main Industries : Walsall (Black Country), Shardlow (Lace), Daley and Chorley (Cotton), Keighley (Wool), Sunderland (coal) (114, 103). Isolated Industries : Partford, Stroud, Stoney Stratford, Blaby (Lace), Hinckley, Foleshill (Cotton), Runcorn, Warrington, Stockton (251, 193). Ports, &c. : South Stoneham (Southampton), Havant, King's Lynn, Wirral, Swansea, Llandaff (164, 120). Coal : East and West Dean, Ashby, Hartshorn, Tamworth, Atherstone, Beasford, Skegby, Chesterfield, Clowes, Blackwell, Kiveton Park, Whiston, Wortley, Wrexham, Penybont (540, 425). Other Mines, &c. : Redruth, St. Austell, Calstock (90, 86). Residential : Thanet, Windsor (32, 26). Market, &c. : Easthamstead and Farnham (Military), Headington (Oxford) (81, 80). In all 52 rural districts (1,448, 1,167). The remaining rural districts whose density is over 50 are Scilly, St. Albans, Barrow-on-Soar, Hayfield, Wigan, Hawarden, Llanelly (231, 129).

and Surrey, and equally with the group next below take in Cheshire and Kent. On the whole, 20 to 30 is typical for the fertile counties of the Midlands, south-east, and Somerset; 10 to 20 for the counties containing downs and fens; 0 to 10 for mountains and moors. Over 30 we have exceptional fertility, as in the Weald, or an infusion of industrial population. The inclusion of market towns increases the density by 10 in the south-east, by 7 in the south-west and Midlands, and by very little in the north and in Wales. In general the purely rural districts have an average density of about 19, increased by country towns and the country elements of other towns to about 25.

A rough study by sample of density and distribution, when the civil parish (the smallest available unit) is taken instead of the rural district, shows, as might be expected, that in the larger unit the extremes are to a certain extent averaged away, so that the very sparse districts are a little underestimated and quite small relatively dense villages are concealed; but the general impression, as described in the previous pages, is unaffected.

Scotland. The area of Scotland is 19 million acres, the population in 1911 was 4,761,000 to the nearest thousand, and the density therefore 25, no more than that of the English rural population. The line dividing urban from rural population must be drawn so as to leave as urban smaller towns than in England, but should not include all burghs, many of which are smaller than English villages. If we count as rural all burghs whose population is less than 10,000, we find 2,144,000 for the rural and 2,616,000 for the urban population; if we count as urban all burghs over 3,000, the numbers become 1,755,000 and 3,005,000. If we draw the line as in England at 30,000, we have only 18 burghs as urban with an aggregate population of 2,166,000. Whichever way of reckoning we adopt, the rural population in Scotland is found to be a much larger proportion of the whole than in England.

Concen-
tration of
popula-
tion

The most significant feature in the distribution of population is the concentration in the district round and

Table III.—Districts with Rural Characteristics.—England and Wales.

(Thousands of acres: thousands of persons.)

	Rural Districts.						Market Towns containing less than 30,000 persons. Totals and Density.	Rural Popula- tion. Totals and Density.	Non-rural Population.												
	Density less than 10.	10-20.	20-30.	30-40.	Over 40.	Totals and Density.															
South-west	36.3	3.0	2,770	409	1,245	208	319	115	4	2	4,701	854	18	140	341	240	4,841	1,105	25	226	801
South-east	30	3	736	135	1,289	311	1,149	417	18	24	3,244	800	27	162	387	240	3,406	1,277	37	480	2,506
West and South Midlands	212	19	2,119	342	1,421	346	649	236	85	42	4,485	985	22	264	400	200	4,690	1,385	40	398	1,427
East	10	1	2,402	372	2,429	570	379	136	0	0	5,310	1,088	21	289	378	130	5,599	1,466	26	189	1,635
North Midland	20	3	593	95	1,377	326	685	267	10	5	2,645	666	26	62	202	350	2,747	868	34	2,117	11,630
Lancs. and West Yorks.	364	31	574	81	336	80	419	170	29	15	1,722	377	22	33	68	210	1,755	445	26	625	2,678
North Glamorgan and Monmouth	2,185	134	2,354	306	242	58	21	8	0	0	4,803	506	11	107	147	140	4,910	653	13	345	1,425
Wales (rest of)	0	0	265	42	40	9	32	14	0	0	337	65	19	8	27	320	345	92	27	525	1,425
Totals	5,152	341	13,450	1,996	8,610	2,066	3,809	1,426	248	136	31,269	5,065	19	1,116	2,070	150	32,385	8,035	25	4,727	22,383
Number of dis- tricts	66		238		183		98		10		595		346				England & Wales	4,951	28,031		

NOTE.—The columns "Market Towns" and "Non-Rural Population" give together the last column of Table II. The last two columns of Table III give together the total population of England and Wales.

Density, 560.

neigh-
bouring
to Glas-
gow.

east of Glasgow. If we draw a line from the coast of Ayr just south of Girvan to the Forth just east of Edinburgh, and another from the Clyde just west of Dumbarton to the head of the estuary of the Tay, thereby including the shires of Renfrew, Linlithgow, Clackmannan, Kinross, and Fife, and the lowland parts of Ayr, Lanark, Edinburgh on the south, and of Dumbarton and Stirling on the north, we include very nearly two-thirds of the population of Scotland on one-tenth of her area. (See Table IV, Group IV.) The density over the whole of this area is 172 persons per acre, and area and population are nearly equal to those of the West Riding of Yorkshire. In Dumbarton, Renfrew, and Lanark (as included) the population is 1,860,000 and the density 320; in Glasgow and 8 contiguous parishes the population is about 1,200,000. This district contains a burghal population (excluding burghs under 3,000) of 2,292,000. To the south of it the corresponding burghal population is only 101,000, Dumfries, Hawick, and Galashiels being the only burghs with more than 10,000 persons. To the north of the region the corresponding burghal population on more than seven times the area is 611,000, of which Dundee accounts for 165,000, Aberdeen for 163,000; no other burgh is over 40,000, and only Perth over 30,000; the remaining burghs over 10,000 are Peterhead, Fraserburgh, and five in Forfarshire. The burghs from 3,000 to 10,000 are distributed among the counties.

General
relative
density
in Scot-
land.

The details given with the table show that the densities in the shires in Groups I, II, III range from 5 to 11, except that Selkirk rises to 15 and Haddington to 25, the burghs being included. In Group V, Argyll,¹ the eastern part of Stirling, and Perthshire (excluding Perth) have densities 4, 5, and 6 respectively. Forfarshire without its burghs, which are in its smaller south-eastern part, is at 8. In Group VI we find densities more comparable with those of the eastern counties, and these would be still higher if we excluded the more mountainous parishes. In the northern counties the densities are very low; the mainlands of Inverness and of Ross and Cromarty are

¹ Argyllshire—Mainland (1469, 57, 4); Islands (521, 14, 2-3).

only at 3, the islands of Inverness-shire at 4, of Ross-shire at 7. Sutherland is under 2, but Orkney as high as 11.

If smaller units than counties were taken, the effect would only be to show slightly greater density on the coast and less in the highlands.

Table IV.

(Thousands of acres : thousands of persons.)

Groups.	Land Area.	Population.	Density.	Urban Population.			
				Municipal and Police Burghs.			
				3,000 to 10,000.		Over 10,000.	
				No.	Persons.	No.	Persons.
I. South-west	1,826	160	9	5	23	1	16
II. Mid-south	597	72	12	2	10	2	31
III. South-east	965	106	11	5	21	0	0
IV. South-central	1,836	3,153	172	35	187	33	2,105
V. North-central	4,526	533	12	11	68	6	254
VI. North-east	2,318	466	20	11	55	3	187
VII. North	7,062	270	4	5	25	1	22
Scotland	19,970	4,761	24	74	389	46	2,615

I. South-west consists of Wigtown (312, 32, 10), Kirkcudbright (576, 38, 7), Dumfries (686, 73, 11), and part of Ayr (252, 17, 7).

II. Mid-south consists of Roxburgh (426, 47, 11) and Selkirk (171, 25, 18).

III. South-east consists of Berwick (293, 30, 10), Haddington (171, 43, 25), Peebles (222, 15, 7), part of Edinburgh (82, 7, 8), and the south-eastern part of Lanark (197, 10, 5).

IV. South-central contains the whole of Renfrew (153, 315, 205), Linlithgow (77, 80, 104), Clackmannan (35, 31, 89), Kinross (52, 8, 14), and Fife (323, 268, 83), and the parts of Ayr (472, 252, 33), Lanark (367, 1,436, 390), Dumbarton (60, 109, 173), Stirling (145, 153, 100), and Edinburgh (152, 501, 330), not included in I, III, or V.

V. North-central consists of Argyll (1,999, 71, 3), Bute (149, 18, 13), Perth (596, 124, 8), and Forfar (559, 281, 30), and the remainder of Dumbarton (97, 31, 32) and Stirling (144, 8, 6).

VI. North-east consists of Kincardine (244, 41, 17), Aberdeen (1,262, 312, 25), Banff (403, 61, 15), Elgin (305, 43, 14), and Nairn (104, 9, 7).

VII. Orkney (241, 26, 11), and Shetland (352, 28, 8), Caithness (449, 32, 7), Inverness (2,995, 87, 3), Ross and Cromarty (1,977, 77, 4), Sutherland (1,298, 20, 2).

The part of Ayr in I is composed of the parishes of Ballantrae, Barr, Colmonell, Dalmellington, New Cunnock, and Straiton.

The part of Edinburgh in III: Borthwick, Cranston, Crichton, Fala, Heriot, Stow, and Temple; of Lanark: Biggar, Carmichael, Covington, Crawford, Crawfordjohn, Culter, Dolphinton, Douglas, Pettinain, Symington, Wandell, Wiston.

The part of Dumbarton in V: Arrochar, Bonhill, Kilmarnock, Luss,

Roseneath, and Row; of Stirling: Baldernook, Balfroon, Buchanan, Drymen, Fintry, Gargunnock, Killearn, Kippen, Strathblane.

The areas are revised to Dec. 31, 1912, and are exclusive of Inland and Tidal Water and Foreshore.

Ireland.

The land area of Ireland is 20,250,000 acres, the population in 1911 was 4,390,000, and the density therefore nearly 22, somewhat less than Scotland. The urban population of Ireland is relatively small, and the rural population is much more evenly distributed than in England or Scotland; of the 32 counties only 4 have a rural density over 20 and only 1 under 10; of the 85 rural parliamentary divisions, which include all Ireland except 9 cities or towns, the densities of 5 are under 10 (West Wicklow, the lowest, is 8), 55 have densities from 10 to 20, and 10 from 20 to 25, and of the remaining 15, 9 are in the counties of Antrim and Down, 2 are close to Dublin, others contain Dundalk and Drogheda, and only 2 (East Cork 27, and East Mayo 29) are rural.

Urban population.

Dublin and its immediate neighbourhood¹ contained 406,000 persons,² Belfast 387,000, Cork 77,000, Londonderry 41,000, Limerick 39,000, and Waterford 27,000; no other town has more than 14,000. All these have easy access to the sea. Thirteen towns have between 10,000 and 14,000. The urban population (drawing the line below these towns) is 1,113,000, very nearly one-quarter of the whole population. If we include all the towns which had a population of more than 3,000 in 1911 we have an urban population of 1,396,000, 32 per cent. of the whole. In the remaining rural regions there are no considerable districts with a density above 30 except in the neighbourhood of Belfast or of Dublin. The densities of Leinster, Munster, and Connaught, as wholes, when the urban population is thus excluded, are between 13 and 14 in each case, while Ulster is nearly 20. When the urban population is included we have Leinster 24, Ulster 30, Munster 17, Connaught 14½. Besides the details in the following table there is little to remark, except that the variations of density within the countries are in general inconsiderable till we take quite small areas.

¹ Rathmines and Rathgar, Pembroke, Blackrock, Kingstown, and Dalkey.

² The remainder of the county has 70,000.

Table V.—Total Urban and Rural Population of Ireland.
(Thousands of acres : thousands of persons.)

	Land Area.	Population.	Density.	Population of Towns over 10,000.	Estimated Population of Towns 3,000 to 10,000.	Estimated Rural Population.	
						Numbers.	Density.
City of Belfast	15	387	258	387	—	—	—
Administrative counties ¹							
of Antrim	703	194	28	24	19	151	21
of Down	609	204	33	12	30	162	17
Armagh	313	120	39	24	7	89	20
Together	1,640	905	55	447	56	402	25
London-derry	515	141	27	41	8	92	18
Tyrone	780	143	18	0	17	126	16
Monaghan	319	71	22	0	4	67	21
Cavan	467	91	19	0	0	91	20
Fermanagh	418	62	15	0	5	57	14
Donegal	1,194	160	14	0	0	160	14
Ulster	5,332	1,582	30	488	90	1,004	19
Dublin	226	477	211	389	16	72	32
Louth	202	64	32	26	0	38	19
Meath	578	65	11	0	4	61	11
Longford	258	44	17	0	4	40	16
Westmeath	435	60	14	0	13	47	11
King's	493	57	12	0	9	48	10
Queen's	425	55	13	0	3	52	12
Kildare	419	67	16	0	11	56	13
Wicklow	500	61	12	0	16	45	9
Carlow	221	36	16	0	7	29	13
Kilkenny	509	75	15	11	0	64	13
Wexford	581	102	18	12	11	79	14
Leinster	4,848	1,162	24	438	94	630	13
Tipperary	1,051	152	14	10	21	121	12
Waterford	454	84	19	27	5	52	11
Cork	1,844	392	21	77	38	277	15
Limerick	664	143	22	39	0	104	16
Kerry	1,161	160	14	10	9	141	12
Clare	788	104	13	0	9	95	12
Munster	5,963	1,035	17	163	82	790	13
Galway	1,468	182	12	13	5	164	11
Mayo	1,333	192	14	0	12	180	14
Sligo	442	79	18	11	0	68	15
Roscommon	608	94	15	0	0	94	15
Leitrim	377	64	17	0	0	64	17
Connaught	4,228	611	14½	24	17	570	14
Ireland	371	4,390	22	1,113	283	2,904	19

¹ In all cases except Antrim and Down, the counties are here given inclusive of the County Boroughs.

CHAPTER XI

DISTRIBUTION OF RACES AND LANGUAGES

BY PROFESSOR H. J. FLEURE, D.Sc.

Introductory.

MANY controversies have gathered around this subject ; some, like that about the relative provinces of Goidelic and Brythonic speech at different times, promote research and help the progress of learning ; others, like the rubbish about Teuton and Celt that is so familiar, are only an obstruction both to study and to general good feeling. The truth about the composition of the British and Irish peoples and their languages at different periods will be gradually approached as researches in archaeological geography are correlated with those in philology on the one hand, and in anthropology, physical and cultural, on the other.

The outstanding facts are :

1. That the foundation of the population in nearly every part of Britain is the same pre-Celtic or Mediterranean stock.

2. That immigrations and invasions have occurred at various periods, but that it is difficult to discriminate, save in broad outline, between the various types of invaders.

3. That the earlier invaders, no doubt a mixed people, brought the two groups of Celtic languages to the British Isles and taught the earlier inhabitants their vocabulary, though the older and now lost language is said by some scholars to have affected the Celtic tongues.

4. That later invaders, increasingly fairer, longer-headed and taller in type, brought the Teutonic languages. They seem to have been able to impose these languages in regions where Roman influence had been sufficiently intimate to weaken the hold of the Celtic languages ; in

other places the Celtic languages were usually adopted by the new-comers, but there are exceptions in both directions.

It must be emphasized at the outset that language difference is only a minor clue to race difference. Many Englishmen, especially in the Midlands and the north, are really descended from aboriginals or from Celtic-speaking invaders, i.e. are of the same blood as many Welsh, Scots, and Irish. On the other hand, the languages of the 'Celtic fringe' are not the original languages of the majority of the people but have been imposed upon them by conquerors. Many elements have been interwoven in the making of the four chief traditions, and even of the minor ones, in the British Isles, and the population in different parts varies mainly in the proportions in which certain elements, all found almost everywhere, contribute to the various complex mixtures denominated English, Welsh, Scots, and Irish.

Stature is emphasized as little as possible in this article as the evidence is so unsatisfactory at present.

All through the coastlands from Morocco to Britain is found the Mediterranean type of man. He has a long face and head, the cephalic index being 70.9 with 75 as the commonest figure, and this dolichocephaly seems correlated with the size of the occipital protuberance. Prognathism is another marked feature. The skin, hair, and eyes are dark, but there are several sub-types, and for the elucidation of these it is necessary to study details of pigmentation, stature, brow, and chin. Many Mediterraneans, for example, especially in Ireland, have practically no pigment of the surface of the iris, and their eyes are grey. Deniker recognizes two races which some other workers would include under the one name, Mediterraneans—

1. The Mediterranean Iberian or Ibero-Insular type: short, large, and long-headed, dark-skinned, dark-eyed, black and often curly haired, prognathous.

2. The Atlanto-Mediterranean or Littoral type: tall, not quite so long-headed as the above, dark in colouring, but not so generally prognathous as the Iberian.

Language
difference
and race
difference

The Medi-
terranean
stock.

Neolithic Mediterranean man found Britain almost in its natural state, for the Palaeolithic peoples had done little to alter it and it is doubtful whether they left many successors to mingle with the Neolithic immigrants. As to this, Beddow and the subsequent workers have found occasional Mediterraneans with Negroid, and others with Mongoloid, characters. These may be mere strays, but, as nearly forty identifications of the Mongoloids have been claimed, mainly from remote corners, it is possible that they may be survivors of ancient types. It is interesting to note that examples of both these types have been found among men of artistic and intellectual distinction.

Physical
conditions
of Britain
at period
of early
habitation.

In the days of early man, Britain still retained several traces of its former ice covering; some of these traces have since disappeared. These were, no doubt, great stretches of low hummocky boulder-clay land, especially along the coasts of the Irish Sea. Many hills were swathed in forest-clad boulder clay which have since been deforested, whether intentionally by cultivators or by governments destroying refuges of outlaws, or accidentally by the scrambling and nibbling of sheep and goats, and then swept bare by wind and rain. The valley bottoms, also rich in boulder clay, were swamps with rivers running hither and thither, and the valley sides had forests up to a level of probably 1,400–1,500 feet above the sea where exposure, especially to sea winds, was not too great. It may be noted that with the hill-sides forested the streams would probably be much more regular and less subject to floods and droughts, than now. In early times after the Ice Age, before the drainage had had time to establish itself, there were probably numerous lakes and pools, especially about the lower watersheds; only a few of these remain. Forest and swamp alike forbade the foundation of Stone Age settlements; the forest contained wolves, bears, and wild boars, and it was difficult if not impossible to force a way through when stone and wooden implements alone were in use. Mediterranean man, therefore, depended upon the open hills and plateau tops, where these were not too high or too craggy for

comfort, and at the same time not sheltered enough to allow forest growth. He could also occupy open cliffs and lowlands near the sea.

A map of distribution of population in those days would show marked contrasts when compared with a corresponding map for modern times. The people would be on the hills, especially on any naturally open plateau tops less than about 1,200 feet above sea-level (e.g. some tops in south and south-west Wales, the Downs, &c.), while the valleys would be untenanted and would often form almost impassable barriers. There would also be a coastal fringe, though not, as nowadays, in valleys leading down to navigable estuaries, but rather on flat and even on marshy stretches, or along cliff brows, and on peninsulas near beaches rich in flint-sand cherts, or rich in small shell-fish used as food. These facts are important not only because they afford a general guide to the situations of the earthworks, tracks, graves, standing stones, and other vestiges of Neolithic man, but still more because the Mediterranean type is found to this day in special numbers and intensity in the valleys near such places. The displacement of population cannot have been so great as some historians have stated, unless perhaps the older types have recently reasserted themselves.

The present distribution of the Mediterranean type is thus only partly due to displacement through pressure from later invaders, it is partly also dependent on the economic circumstances of those early times; the old hill people have moved down to the valleys near their old homes in the wake of the exterminated forest. Traces of this migration may be found even in the movements of families in historic times and in the divisions of the shires and the names of those divisions. The plateau tops of Wales, the moorlands of the Pennines, the Downs, the moors of Devon and Cornwall, the Highlands and south-western Uplands of Scotland, the moors and hills of many parts of Ireland are thus, for economic reasons as well as for reasons of pressure, centres for the Mediterranean type, which is found in special numbers, this time mainly

Distribu-
tion of
early man.

Present
distribu-
tion of
Mediterranean
type.

because of pressure, in the remoter valleys off these centres. It was also characteristic of the coasts, but only survives here and there, as for example on the west coast of Wales, as these positions have been forced by all invaders.

The Mediterranean type is also numerous in old forest districts where the older population has, perhaps several times successively, fallen back upon the forest as a refuge. Such places include the country of the old forests of Dean, Arden, &c. The Weald and the valleys of the western Downs need further examination, but of course they have felt many invasions. The Fens are perhaps another refuge-district in which the old stock has persisted, as it has near the chalk country in Buckinghamshire, &c.

Regional
differ-
ences in
Mediterranean
type.

There are certainly differences in different regions—the grey Irish eye, the rather low Irish head, the Cornishman's well-marked brows, the prominent but not broad cheek-bones of many Irish and Scotch, helping to give the characteristic physiognomy of so many Camerons and Frasers, the variation in stature, and so on. But for the present it is best not to subdivide the type too minutely; we may think of it rather as the general foundation of the population surviving for various reasons in different districts. The men of this type are relatively longer-headed than the women, while the latter inherit more strongly the pigmentation of hair and iris. A group of British Mediterraneans may be made up largely of grey-eyed men and brown-eyed women.

Pre-Celtic
traces in
Welsh
languages,
&c.

Morris Jones has claimed that Welsh as a language has inherited such features as the order of words in the sentence, personal suffixes and other details, from some older tongue related to Berber and ancient Egyptian. If that be so (but it is disputed), perhaps the Neolithic people learned the vocabulary of the Celtic-speaking foreigners slowly enough to permit of the retention of much of their old language. A few place-names are said to go back to pre-Celtic roots, and it has sometimes been suggested that the strange incantations and counting-out rhymes in fairy tales, legends, and children's play may include corrupted vestiges of the long-lost language which was

ousted by Celtic speech. The old rites and ceremonies and the old holy places may have retained their importance in spite of the first change of language.

'Long barrow long skull, round barrow round skull' is a widespread maxim among archaeologists. The round barrows, however, also contain long skulls, and it is

Round-skulled invaders and Celtic languages

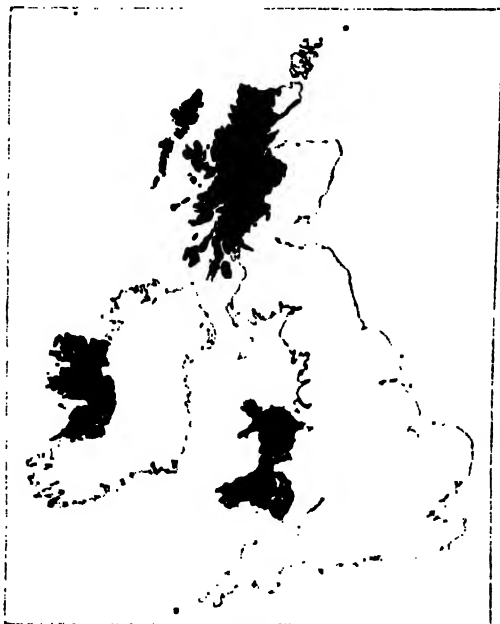


FIG. 57. Distribution of Celtic-speaking Population (in black areas over 50%, and in tinted areas over 25% of total population).

generally held that a race with round skulls, building round barrows, invaded and dominated Britain, ultimately amalgamating with the older people of the land. It seems that the new-comers used bronze fairly soon after their arrival, though they may have landed without it. Their pottery was abundant and had characteristic features which have been studied in great detail by Abercromby.

A wrong impression has been given by statements of various anthropologists about the supposed uniformity of cephalic index in the British Isles, because it has thence

been inferred that, as the index is said to be 77-9, the round-skulled people must have disappeared. As a matter of fact this figure is only a district average, and district averages are misleading and almost valueless. The Bronze Age race has probably not disappeared, but it cannot be easily distinguished from other invaders.

Distribu-
tion of
invaders
and sur-
vival of
Neolithic
type.

The round barrows are correlated by many archaeologists with a metal-using people, and local tradition and fairy tales, especially in Wales, seem to hint at the intrusion of 'shepherd people in the valleys. These seem to have been seasonal nomads with head-quarters (*Hendref*, &c., in Welsh) in the valley, and summer shelters (*Hafottau* in Welsh) on the hills, where perhaps they met the fairies. The tales often tell of marriage with a fairy woman, and of the anxiety of the fairies to secure the children. The invaders may have been mostly men, pioneering and later on prospecting for metal along the sides of the forested valleys, while there can be little doubt about the heavy infant mortality of the people of the hills; changeling tales are, however, very widely distributed in many lands. The hill-children are dark and maybe wizened, and this is an indirect indication of the lighter colouring of the invaders. In looking for descendants of these invaders we must consider carefully the physical features of a district. In a district with valleys around an extensive moorland the Neolithic people will very probably have ultimately swamped the invaders, especially if these had few women. We must look for them rather in valleys bounded by steep and craggy hills unsuited to the Neolithic folk, especially if access to the valley is not easy enough to lay it open to every invader. We may also look for them in the byways off the lines of invasion and immigration from Central Europe.

Cranio-
metrical
divisions
of Europe.

Broca and Beddoe may be held to have settled the doctrine of three great craniometrical divisions of the continent of Europe—

1. A southern or Mediterranean dolichocephalic area (the people are dark and rather short and often have oval faces ; but see Deniker's view above).

2. A central or Alpine brachycephalic area (the people are brown or darker, short save in certain cases, stocky, sometimes with aquiline profile).

3. A northern dolichocephalic area (the people are tall and fair and often have shield-shaped faces).

The linking of the people with the soil and consequent diminution of migration would seem to have spread on the whole from south to north in Europe, so that whereas the earlier migrations to Britain were from the south, the later ones came from further and further north, though the Scandinavian immigrants seem to have been more often small groups of adventurers than large migrating bodies.

The people of middle Europe, however, in shifting westwards towards Britain would have to come out on the European plain and several blends between Alpine and northern types seem to have arisen there. The latter element may have contributed its stature and perhaps more or less of its coloration to the blend, while the latter may have given it a broad head and may have influenced the colour, especially of the hair. There are people of many varieties, all possibly Alpine-Northern in origin. Some are dark and tall and broad, almost square-headed, with strong brows; others are short, dark, but with grey eyes, and plump, with broad round heads; others are tall, rather fair, broadly round-headed, and aquiline in profile. There are islets of fairly pure Alpine types on the westward route from central Europe towards Britain, e.g. in the Ardennes, Zeeland, Jutland, and south-west Norway, and they occur in certain parts of the British Isles, but there is usually then some evidence for supposing that they have come in as sea-rovers, 'Black Danes', from Denmark or Norway, as will be explained hereafter. It is probable that immigrants to Britain who came from central Europe would sooner or later meet and follow the Rhine, and would then continue along the sea-shore, probably sighting Britain during short excursions from Flanders, &c. Abercromby seems to confirm this supposition as regards Bronze Age invaders from his study of pottery.

Local
cranio-
metrical
types.

Probably the rather broad-headed, strong-browed medium to fair people who are to be found in most localities owe something to the round-skulled invaders, and there is much still to be learned from a study of local types. One notable district for broad-headed men, usually rather fair and tall and with aquiline profile, is the great valley-line from Corwen to Dolgelly, protected by mountain crags on both sides and relatively difficult of access at both ends. The type is well known to most Welshmen and retains a marked individuality, mental as well as physical. Their cephalic indices are usually 80-4, red hair is scarce among them, and the Armenoid nose is most characteristic. These men may not date back to the Bronze Age in their present home, in fact they are connected, in local belief, with a post-Roman invasion from the Lothians or thereabouts, but it seems likely that they represent a Bronze Age round-skulled type. A dark variety of this type was also identified by Beddoe in the Cumbrian Dales. The index 80-1 is common in East Lothian, Fife, and East Aberdeen. Inland also broad-headed, dark, short men are occasionally found, but when they occur in England the temptation is to refer them to Norman or later colonization, especially in Bedford, Sussex, &c. When they occur near the coast in Wales or Scotland, they may belong to the sea-rover people already mentioned, but sometimes they are fairly numerous and firmly rooted in remote inland valleys, e.g. of north Montgomeryshire, and it is possible that they have come in mingled with the other round-skulled invaders already discussed. They are too distinct in many features to be explained as 'marginal types', to an extreme in the direction of head-breadth from the Mediterraneans.

Introduc-
tion of
Celtic
languages
to the
British
Isles.

If Broca's view is accepted, it was probably a mixed people, round-skulled men and Mediterraneans, who brought the Celtic languages to the British Isles. Sir John Rhys supposes that an early wave of conquest brought the Goidelic or Gaelic types of Celtic speech, and that a later wave brought the Brythonic or Cymric speech

which pressed the earlier languages westward and northward. He supposes that Goidelic languages persisted here and there near the west coast of England and Wales right down to Roman times, while pre-Celtic speech still lived on in the Scotch Highlands and Galloway. A continuation of the westward pressure would have confined the Goidelic languages to Ireland and the Highlands, Wales and Cornwall at any rate becoming wholly Brythonic. Zimmer and Kuno Meyer advance a very different view. They think that the Goidelic group of languages reached Ireland from France, perhaps from the Loire valley, without touching Britain at first, while Brythonic-speaking people spread to Britain from the adjacent coasts of northern France and the Netherlands. Some hold that the evidence favours this latter view, but there is need for a great deal of anthropological and other investigation before it may be claimed that the question is settled.

Rhys shows that Goidelic was once in use in south-west Wales, for example, but Zimmer claims that this was in post-Roman times. Perhaps the study of physical types of the Welsh population could be made to tell in favour of an invasion at various points of the west coast, presumably for the sake of mineral wealth which, again presumably, the Romans had gone to Wales to exploit.

If Ireland has received some of its population almost direct from France we are certainly better able to understand the rather tall and not absolutely dark variety of Mediterranean which seems to be characteristic of the country: it would be some blend influenced by Deniker's littoral race. The evidence, however, is still insufficient, and it may be necessary to alter hypotheses radically. We may never know who brought the Celtic languages to Britain. A journey from France to Ireland direct would be a formidable matter in prehistoric times, and one is tempted to think the route would be via Cap La Hague, Isle of Wight, English coast, Cornwall and south-west Wales, if any was really in use so long ago.

Conditions
at period
of Roman
invasion.

At present we may say that the round-skulled invaders, presumably of the Bronze Age, are not extinct, but have preserved their type here and there in western valley lines as well as in parts of eastern Britain, while it is doubtful whether they have influenced Ireland much. They may have been Alpine-Northern in type rather than pure Alpine, and Park Harrison believes that their survivors at the present day usually have light hair and long adherent ear-lobes. We may perhaps venture the view that the British people in Roman times included, in England and Wales, the central valley of Scotland, and many east coast situations, an aristocracy and sometimes almost an entire population which was fair-haired with mixed Alpine and Northern characters. They ruled over people still mainly Mediterranean, and the latter must have been almost unmingled in certain localities. Ireland must have been almost completely Mediterranean. The people of east Britain spoke Cymric languages ; Ireland spoke a Goidelic language ; a pre-Celtic tongue may conceivably have survived in the Scottish Highlands, Galloway, and perhaps elsewhere. The language of Strathclyde, Wales, and the west of England is the subject of dispute between Rhys, Zimmer, and Kuno Meyer.

Roman
times and
influences.

The influence of the Romans on race and language was mainly indirect. They apparently wished to prevent Britain from abetting continental revolts, and they desired to exploit the country's traditional wealth of minerals. The English plain felt the full Roman discipline and a Romano-British civilization developed. The native leaders probably took refuge in successive relays in the wilds, ready to return if Rome's hand weakened. The Cymric language was thus probably reduced to a mere patois on the English plain, while, in the wild west, it was reinforced, if we accept Zimmer's view, or implanted if we take Rhys's theory, by the accession of leaders and by the growth of a Cymric pride and tradition ; chiefs and warriors in exile always try to maintain a proud tradition.

When the power of Rome decayed, Britain was exposed

to attack not only from the barbarians of north-west Europe, but also from Ireland, which seems ere this time to have developed an indigenous civilization ; islands are advantageous from this point of view. The Romans had exploited mineral wealth, and, whatever may be the truth about the Goidelic question, it seems likely that Irish raiders, miners, and even settlers appeared, as the Romans left, on the south and west coasts of Wales, Anglesey, Galloway, the Clyde, and the Highland shores. Possibly it was at this time that Gaelic speech finally established itself in the Scottish Highlands.

The general type of the post-Roman invaders was probably still for a time Alpine-Northern, for they seem to have streamed out from the mouths of the rivers Scheldt and Rhine, Weser and Elbe, pressed on from behind by other peoples moving westward over the European plain. But by this time the northern element seems to have become more predominant, so that the invaders of Britain were mostly very fair though their heads were rather broad. One finds many men to this day with the northern colouring and disharmonic heads, the skull and cheek-bones fairly broad, the cheeks sunken, the jaws narrow, and the chin prominent ; in other words, we seem to have a northerner with a skull-type influenced by the Alpine characteristics. Such types are abundant on the English plain and along the eastern coastlands generally, but it is obviously difficult to say which belong to the post-Roman invaders and which to the pre-Roman immigrants. In all cases we must also be prepared to find the influence of the old Mediterranean stock. It is very difficult to trace these post-Roman invasions anthropologically, though the ' Saxon ' type is popularly fairly well known—a rather bulky northerner with only slight traces of the possible Alpine admixture, the brow being smooth and regular. We are thus forced back for the present to rely on tradition and records.

Kent and East Anglia seem to have been very thoroughly occupied by Jutish and Anglian (in general terms Danish) peoples, but the older inhabitants are said to remain

Post-
Roman
invaders

Jutes and
Danes.

around Romney Marsh and Brandon. Such islets of older peoples are usually recognized through the abundance of quite dark hair, often an indication of the importance of the Mediterranean element in the population.

Saxons.

The south and south-east coasts of England were attacked by Saxons. Sussex was hampered in its development by the absence of inlets and by the great forest of the Weald in the background. Wessex, on the other hand, had great bays and inlets and much open down-country so that the invaders were able to spread their power till they came to the barrier of the Thames valley with its woods and swamps. The Weald forest, and some of the more secluded valleys in the western Downs, would seem to have remained to the older inhabitants, who, no doubt, also persisted as serfs even near the coast. In the north the same progress was continuing. The result was a mixed people, preponderatingly fair on the coast and preponderatingly dark near the moorlands and fens inland. This would also be true in a general way of all the British coasts north of the Wash. Nearly a quarter of the east coast population is said to be rather broad-headed. Wessex, and especially the open Downs (around Stonehenge and Avebury), had been, perhaps, the most important part of the whole country in the Bronze Age. It retained its dominance until elaborate settlements and agriculture gained their predominance in the Middle Ages. It was in Wessex apparently that Bronze Age and Stone Age peoples learned to combine, and it was this part of the country which later on spread its shire system of local organization over other parts of Britain.

The Midlands :
physical
obstacles
to invasion.

The Thames valley, the strength of London, the swamps of the Ouse and the Fens would all be obstacles to the invasion of the Midlands, and a still greater obstacle was the forest which covered so much of the country. For these reasons the old types of people, especially the Mediterraneans, persisted with little admixture for a time in many parts, but the English Midlands were no doubt sparsely inhabited in early times because of swamp and forest. It should also be noted that the early relations of

Mercia were mainly with the north, not with the southern districts beyond the great barrier of the Thames valley.

These invaders spoke Teutonic languages and found in east Britain, probably, only a degenerate dialect which soon fused itself into their speech. The words which English has thus inherited from the Welsh deal mainly with domestic or servile activities, i.e. they are words learnt from serfs, chiefly names of common things used by them and by women whom the invaders retained.

The more northern people seem to have moved in warrior bands and were perhaps the surplus population of successive generations, seeking a new home because there was so little room for extension on the shores of Denmark and Norway. They were hardy seamen, and seem to have set forth not so much to find land as soon as possible, like their predecessors, but to establish chains of stations whence they could trade and plunder and perhaps hire themselves out for war. Thus they infested not only the east but also the west coasts of Britain, and Ireland suffered much at their hands, for its early civilization had now passed its prime. The Welsh stories make an interesting distinction between Black Danes and Fair Danes. This should be considered in connexion with the fact noted above that there are islets of fairly pure, dark Alpine men in south-west Norway, Jutland, &c. It then becomes apparent that these may be the originals of the Black Danes, and the surmise receives additional support from the fact that broad-headed dark people are found in the Hebrides and Orkneys and right along the coasts of the Irish Sea (Beddoe).

Along with these, but more especially in the navigable estuaries of Britain, west as well as east, is found the true fair Scandinavian with narrow head and often fine features and tall stature. He has remained as an important element in the population around the Trent and Humber, Tees and Tyne, Forth and other river mouths on the east, and particularly in eastern Caithness. On the west he used the Clyde, the Mersey and other Lancastrian estuaries, the Dee, the Conway, the Teifi, Milford Haven,

The Scandinavians:
'Black Danes.'

'Fair Danes':
the true Scandinavians.

the Severn and minor openings. He seems to have occupied South Glamorgan, the Gower peninsula and South Pembrokeshire as favourable, perhaps because defensible, stations, and Beddoe thinks he used Lancashire and the Hebrides as stations, with the Shetlands as a basis of operations. In Ireland the north, east, and south coasts were most affected; perhaps the barrenness and exposure of the north and west diminished the attractions of their many inlets. The people of the east, north-east, and south-east coasts of Ireland and of the south country westward to the golden vale of Limerick are much fairer in type than are those of Kerry, Connaught, and Donegal. There are also Scandinavian place-names at the north-east and south-east corners of Ireland and near Dublin. It is interesting to note that the sea-rovers did not usually alter the languages of the west, and have in time become merged in an Erse, Gaelic, Welsh, or Cornish-speaking people, losing the memory of their separate origin. They have very obviously contributed to the vigour and enterprise of the people of the Celtic fringe, with whom they have fused, and to whom they have contributed some leaders of note in modern times. In south Pembroke and Gower, and perhaps in south Glamorgan, they seem to have settled in such large numbers as to oust the older language, but this will be discussed later. Perhaps their occupation of Lancashire helped to break the connexion between the Celtic-speaking peoples of Wales and Strathclyde; at all events, Lancashire, Cumbria, and the Solway district are rich in Scandinavian place-names. On the English plain the Saxon rulers had lost much of their military efficiency by the time the Norsemen appeared in force, for the Saxons had easily enslaved a population softened by Roman civilization. In the west matters were otherwise, for the struggle between Anglo-Saxon-speaking and Celtic-speaking peoples was prolonged and severe.

The
Norman
Conquest.

Beddoe made special efforts to ascertain the effects on the physical types of the population produced by the Norman Conquest. The direct effects seem to have been

small ; a military aristocracy came in, but in many cases returned to Normandy before many generations. Those who stayed married native women, and in process of time the native element reasserted itself, as the disappearance of Norman-French shows. After the Conquest, however, Beddoe believes there must have been a considerable immigration of real settlers, mainly farmers, and he thinks that he has traced many of these to Bedfordshire, which had not been very fully occupied in earlier times (see above concerning the Saxons and Mercia). These immigrants would come from northern France and would include dark Alpines : several localities exhibit this type even now. Flemings were introduced by Norman rulers, and Henry I ultimately settled them in south Pembrokeshire, where the English language, originally perhaps a *lingua franca* between Welshmen, Norsemen, Flemings, and Norman, became the established tongue. Men from the Low Countries continued to arrive during the Middle Ages, bringing with them their skill in wool-weaving. From the sixteenth to the eighteenth centuries this element was further strengthened by the addition of refugees fleeing from religious persecution, a moral and intellectual *élite* from France as well as Flanders. These immigrants have been important elements in the population of several of the old cities, of Norwich and Canterbury and Belfast, of the towns of Bedfordshire, and of many other localities. Their names have usually been Anglicized and they have completely merged in the population, to the progress of which they have contributed much in thought and art, education, and politics. Some of them were certainly Alpines, others Alpine-Northern ; the latter were usually from Flanders, the former more often from France. The Jew was for so long excluded from England that he has not become such an important element in the population as he is in Germany and Slavonic lands. Nevertheless, here and there the true Semitic and the Armenoid characteristics are found, though the possessors of these features are frequently unaware of any Jewish ancestry.

Modern
immigra-
tion.

The increased facilities for travel have promoted international relations in the nineteenth century, and there have been many immigrants from European countries to Britain and especially to London. Many of these immigrants are either Mediterraneans or Alpines, the latter mainly from southern Germany or from the Slavonic-speaking countries. Similarly there have been many emigrants from the British Isles, and it is sometimes surmised that among them would be found a large proportion of the large-limbed, fair-haired northern folk, less resistant than the Mediterraneans to the evil effects of industrial life. The Mediterranean element is said to be on the increase and the spread of Welsh types and names over the English border is an undoubted fact. The alterations of racial type must be carefully distinguished from the shifting of the language boundaries in modern as well as in ancient times.

GENERAL SUMMARY

Languages of the British Isles

1. Lost pre-Celtic languages, probably related to old Mediterranean languages, as evidenced according to Morris Jones by the syntactical peculiarities they are supposed to have transmitted to the Celtic languages. This view is much disputed. Entirely extinct except for a few place-names, &c.

2. Goidelic-Celtic languages, now spoken as follows : *Irish Gaelic* in Kerry, Connaught, and Donegal ; *Scottish Gaelic* in western Caithness, Sutherland, the Hebrides, the Grampians, and Argyll. *Manx Gaelic* in the Isle of Man.

3. Brythonic Celtic languages. *Welsh* spoken almost throughout the Principality, though English has taken possession of the Severn and the Wye valleys and of Radnor Forest between them ; south-eastern Glamorganshire, Gower, and south Pembroke are also English-speaking. Welsh is advancing in certain localities and probably retreating in others. *Cornish* is now extinct.

4. English. A language of the Teutonic group, much altered by contact with Celtic and Norman-French speech. Many dialects in England, Scotland, and Ireland are partly due to original peculiarities of post-Roman immigrants from various parts and to Scandinavian settlers later.

Racial Types

1. The Mediterranean-Iberian. Rather short, dark, long-headed, prognathous. Found in most districts, but especially numerous around Dartmoor, Bodmin Moor, &c., in South Wales near plateau-tops, in the Forest of Dean, Forest of Arden, Cannock Chase, and other wild districts of the Midlands, in the Pennines near the moors, in the southern Scottish Uplands and among the Highland moors, in Kerry, Connaught, and Donegal. Also characteristic of some parts of the Fens, and of various other spots, including some valleys of the Downs. Some of these people have moderate-sized heads and regular oval faces. Others, especially in Wales, have very large heads, the occiput being remarkably long. Some of these latter, especially in the Plynlimon moorlands, have very low receding foreheads, a skull-index of no more than 70, rough features and distinct prognathism, inevitably recalling the characteristics of such Palaeolithic types as that of Neanderthal.

2. The Mediterranean-Mongoloid, perhaps a stray, but nearly forty cases have been now noted in Cornwall, North Wales, Pennines, &c.

3. The Mediterranean-Negroid, perhaps a stray—curly black hair, marked prognathism.

4. The Mediterranean-Littoral type of Deniker, perhaps found in Ireland and North Wales, &c., but not very certainly identified.

5. Types probably resulting from dilution of the above characters often have fairly long heads, dark-brown hair, brown or grey eyes, while the prognathism has usually disappeared.

6. The Alpine type, broad-headed and dark. Rarely found in its typical continental development with the profile sloping downwards and forwards. Occasionally occurs in inland valleys, very characteristic of several exposed strips of west coast of Britain (see 'Black Danes' above), also in Hebrides, Orkneys, &c., seen in Bedfordshire, &c. (see Norman and later immigrants), also in Gloucestershire, &c.

7. Alpine or Alpine-Northern types with broad head and face, rather fair hair and aquiline profile, tall, strong, and intelligent. These may be the Bronze Age invaders and they have been noted as characteristic of some valley lines in North Wales. They will probably be identified elsewhere.

8 Alpine-Northern Disharmonic types with broad head, strong brows and cheek-bones but long chins. Red hair and beard or moustache seems to occur frequently amongst them. They are very characteristic of the Welsh coasts, and apparently of the Scottish Highlands.

9. Alpine-Northern types with rather broad heads, fair

hair, rather oblong faces in many instances—have been called Saxon types and are found inland in the western Midlands and almost everywhere on the English plain.

10. Almost pure Northern types, have apparently spread from the various estuaries found on both east and west, and in Ireland. Probably a tendency to red hair. It is often difficult to separate this element satisfactorily from extreme cases of 9 and 10 and mixtures of these with 1 or 4.

Population of Districts

A. Ireland. Mainly 1 and 4 with grey eyes rather than brown. Numerous 9-11 in the south and especially near Limerick. Numbers of the latter and perhaps of 7 and 8 along the east coast. 7 also in Antrim.

B. Scottish Highlands. 9-11 in eastern Caithness, 1 and 4 around the mountains and moorlands. All these types, and 7, in the islands and probably on the east coast.

C. The Central Valley of Scotland. Mainly 9, 10 and 11 with some 1, &c. in various parts.

D. South Scotland. A fairly large proportion of 1, but numbers of 9-11.

E. North England. 1 around the Pennines, 11 on the coast and up the navigable rivers, 10 and 9 also found, 2 has been noticed in the Pennines. The E. coast population includes 25 per cent. of broad heads.

F. The Midlands. 9, 10 and 11 with a foundation of 1 and islets of the latter in several places: the southern end of the Pennines, Cannock Chase, Forest of Arden, Buckinghamshire, Herefordshire, the Fens, &c. 7 identified in the south-east.

G. North Wales. 7 and 9 very characteristic of the coast, 8 found along Corwen-Dolgelly line, 1, 2, 3, 4, and 5 here and there, especially around moorlands, e.g. that of Denbighshire.

H. South Wales. 1 very characteristic especially of inland valleys of streams draining the moorlands, 7 and 9 on the coasts, 9-11 in Gower and south Pembrokeshire and south Glamorgan.

I. Mid Wales. 1 and 10-11 very characteristic (Brecon, Radnor, Montgomery), 7 not absent.

J. South-west England. 1 very characteristic around the moorlands, 9, 10, and 11 on the coasts. 7 probably occurs.

K. Wessex. 9, 10 and 11 with a foundation of 1, the latter especially in remote valleys.

L. Sussex, &c. As Wessex, probably some 7.

M. Kent. Largely 11, some 1 near Romney Marsh, &c.

N. East Anglia and Lincolnshire. Largely 9, 10, and 11, with 1 on some patches of heath country and in the Fens.

O. In the great towns type 1 is said to be spreading everywhere at the present day.

Beddoe's *Races of Britain* is the foundation of all subsequent work. Bibbio- and his Rhind Lecture on 'The Anthropological History of Europe' graphy. (1912 ed.) gives his latest views. Deniker's Huxley Lecture, 'Les six races composant la population actuelle de l'Europe,' is an important contribution. Ripley's *Races of Europe* is another important recent synthetic treatise. Abercromby's *Bronze-Age Pottery of the British Isles* brings much valuable new evidence to bear on ethnical questions. Rhys's and Brynmor Jones's *Welsh People*, with an appendix on the relation of the Celtic to the older languages, by Morris Jones, is an introduction to the linguistic side of the question. Also numerous other works by Sir John Rhys. Zimmer's *Woher kamen die Goidelen nach Irland?* states the Goidelic controversy very clearly. Several facts are quoted from work now being done by the Ethnographical Survey organized in connexion with the Guild of Graduates of the University of Wales by H. J. Fleure and T. C. James.

CHAPTER XII

PUBLIC ADMINISTRATION

BY PROFESSOR W. G. S. ADAMS

IN approaching the consideration of the public adminis- Cabinet. Ministers and Civil Servants.
tration of the United Kingdom, it is important to note two outstanding features. The first is the system of Cabinet Government which ensures that at the head of the great administrative departments there are political officers who sit in Parliament either as members of the House of Lords or of the House of Commons, and who are able to answer in Parliament for the policy and administration of the several departments. With a change in government the political heads of the departments change, but during the tenure of office of any ministry it is not uncommon for a minister to serve as the political chief first of one and then of another department. The second feature is the existence of a permanent civil service having in each department at its head the permanent secretary of the department—or some corresponding officer—who is, or ought to be, the chief adviser of the political minister for the time being responsible to Parliament. This staff combination of the experienced parliamentary and political officer with the experienced civil service officer is

a feature which is most fully developed in the British type of administration, and has proved to be an arrangement of great practical value.

Control of
Parlia-
ment over
adminis-
tration.

The theory which underlies the system of British administration is that of its direct responsibility to Parliament. But the control of Parliament is far from being as real and effective as might be supposed. This is due mainly to two causes: first, the congestion of parliamentary business, and second, the great development in the administrative functions of the state, and the corresponding growth of the permanent civil service. With the congestion of parliamentary business we are not here concerned, save to point out that the pressure of legislation leaves Parliament very little time to consider the policy and working of the administrative departments. But the second cause requires special notice. The multiplication and development of the administrative departments has been partly the result of that general extension in the functions of the state which is taking place in all progressive countries. Thus in recent years the establishment of the Old Age Pensions System, the National Health Insurance Commissions, Labour Exchanges and Unemployment Insurance, Wages Boards, and the extension of the machinery of Industrial Arbitration and Conciliation—these and other developments mark the growth within the United Kingdom of new ideas as to the sphere of state action. But special circumstances have also led to the multiplication of administrative departments. The United Kingdom being a union of nations with very different social and economic conditions, there has been, especially within recent years, a great extension of administrative devolution. In education, in local government, in agriculture and fisheries, in the land question and in the treatment of backward, or, as they are officially called, congested areas, and lastly in national health insurance, separate administrative machinery has been established to deal with English, Scottish, Irish, and to some extent Welsh conditions. It is true that there long have been in certain matters special administrative

Recent
expansion
of admin-
istrative
system.

departments for Ireland, and to a less degree for Scotland. But since 1880 these have been established : In Ireland the Irish Land Commission 1881 ; the Congested Districts Board 1891, reconstituted and enlarged 1909 ; the Department of Agriculture and Technical Instruction 1900 ; the Estates Commission 1903 ; the Irish Insurance Commissioners 1912 ; and in Scotland, the Fishery Board for Scotland 1881 ; the Scotch Office 1885 ; the Crofters Commission 1886 ; the Local Government Board for Scotland 1894 (superseding an existing board known as the Board of Supervision) ; the Congested Districts Board 1898 ; the Land Court and the Board of Agriculture 1912 ; the National Health Insurance Commissioners 1912. Moreover, in most cases the work of these and of other existing departments has been yearly growing in amount.

There has been much less devolution in the case of Wales, but in educational administration separate provision is now made, first through the system of intermediate education which is under the control of the Welsh Intermediate Board established 1890 ; second, through the creation within the English Board of Education of a Welsh department dealing with elementary education in Wales. Similarly under the English Board of Agriculture and Fisheries, a Welsh Commissioner for Agriculture and an Agricultural Council for Wales have recently been established (1912), and under the National Health Insurance Act a separate Commission for Wales has been constituted (1912). The administrative system within the United Kingdom has thus been rapidly expanding within recent years, and this consideration has throughout to be borne in mind. For if public control of administration is to be real the control of Parliament as it now exists is no longer adequate, and the United Kingdom has again before it the problem of reorganizing and readjusting the relations between the central administrative departments and the elected representatives in Parliament and in the Local Government Councils.

The present chapter does not deal with the Imperial departments, such as the Foreign Office, the India and

Scope of
the chap-
ter.

Colonial Offices¹, the War Office, and the Admiralty, nor does it take account of the work of the local administrative authorities. What is here reviewed is the system of state departments affecting the government and administration of the United Kingdom, or the parts thereof. Now even thus circumscribed the central administration of the United Kingdom presents a very varied and complex organization. Experiment guided by experience of immediate needs rather than a logical conception of order and symmetry has shaped the growth of British administration. Classification, therefore, is not familiar. But, for the purpose of obtaining a survey of the system as it is, the departments under review may be divided into three main groups distinguished as follows :

First : the Treasury and departments associated with or subordinate to the Treasury.

Second : other central administrative departments which concern the United Kingdom as a whole.

Third : local national departments which deal with the several parts of the United Kingdom, and in most of which there exists a close relationship with the local administrative authorities.

Finally, there remains, outside of these groups, the Civil Service Commissioners who deal with the regulations and examinations for admission to the Civil Service throughout the United Kingdom.

1. *The Treasury and Associated Departments*

In this first group we have to consider :

(a) The Treasury.

(b) The Exchequer and Audit Department.

(c) The departments associated with or subordinate to the Treasury.

The
Treasury.

(a) The Treasury is the centre of the administrative system of the United Kingdom. It has grouped closely round it the financial and certain other special departments of state, and it exercises a general supervisory function over the whole Civil Service as regards maintenance and organization. It approves the annual

¹ [For Colonial Administration, see vol. vi, chap. i, &c.]

estimates of the several departments of the administration before they are presented to Parliament, and through its control over finance it can and does exercise a great influence on public administrative policy.

But the Treasury holds also a unique position in respect of the political constitution and functions of the Board of the Treasury. The Board of the Treasury consists of the First Lord of the Treasury, the Chancellor of the Exchequer, and, as a rule, four or five Junior Lords of the Treasury. All these members of the Treasury Board are political officers and change with the Government. They constitute what might be fittingly regarded as the department of the Prime Minister, who as Prime Minister has no department. It has become the custom for the Prime Minister to hold the office of First Lord of the Treasury, a position which involves the exercise of considerable patronage, while it is not concerned with the administration of the Treasury as the financial centre of the administration. The Patronage Secretary, who is the Senior Whip, and the Junior Lords of the Treasury, also more familiarly known as the Government Whips, may be said to be the Prime Minister's staff officers. They have to deal with the organization of the party, with the arrangement of business in the House of Commons, with the maintenance of the voting strength of the party, with the control of the party associations throughout the country, and—a matter for the Patronage Secretary—the management of the party chest. At times the Junior Lords also serve as Parliamentary representatives of different administrative departments, but their main work is to be the party watch-dogs, and to gauge the feeling of the party inside and outside Parliament as regards the policy of the Government.

But, important as are the political functions of the Board of the Treasury, we are here concerned chiefly with the Treasury as the centre of the financial administration of the United Kingdom. In this sphere the senior parliamentary representative and the administrative head of the Treasury is the Chancellor of the Exchequer. He is

Financial
adminis-
tration.

responsible to Parliament for the Budget and for the administrative policy of the Treasury, and in the Government of the day his position stands second only to that of the Prime Minister. With the enormous development in the public financial interests of the country, and with the remarkable expansion in the sphere of governmental action, the office of the Chancellor of the Exchequer has steadily grown in influence and power. Developments involve expenditure, and the Chancellor of the Exchequer is therefore consulted by other ministers in the preparation of their schemes. But apart from this consideration, there is the striking fact that in recent years the Chancellor of the Exchequer has been the minister who introduced in the House of Commons the most important measures of social reform. The Old Age Pensions Act, the Act establishing the Development Commission and the Road Board, and the recent National Health Insurance Act, are alike measures which may be considered Treasury measures, while land valuation and the relations of the State to unearned increment and monopoly value have become active Treasury questions. These are conditions which make the position of the Chancellor of the Exchequer one of outstanding importance and responsibility, politically and administratively, and also add considerably to the influence of the Treasury. The Chancellor of the Exchequer is in turn assisted by a parliamentary officer known as the Financial Secretary of the Treasury. It is in his name that the memorandum on the annual estimates is presented to the House of Commons, and on him falls a heavy share of explaining and defending the policy of the Treasury or of the departments under its control. Under the parliamentary officers of the Treasury there is ranged, as in other administrative departments, a permanent staff, at the head of which stands the Secretary of the Treasury, the highest officer in the permanent Civil Service. Recently, and it may be temporarily, the duties of the office have been divided between two Joint Secretaries. The permanent Secretary of the Treasury is usually a man who has had wide experience in the Civil

Service, and the practice has been common of promoting to this position an officer who has been at the head of some important branch of the administration.

The strong position of the Treasury in the administrative system of the United Kingdom is due chiefly to the fact that through the Treasury pass all estimates of the various departments of state on their way to Parliament, and that the Treasury thereby exercises a very real power of control over the expenditure and policy of the various branches of the administration. The question of the control over public expenditure is so important that the necessary procedure with regard to the annual estimates deserves attention, and may be briefly stated as follows: Each year, early in October, a circular letter is issued by the Treasury to the various departments, requesting them to furnish estimates for the next financial year. In the several departments on receipt of the Treasury letter the permanent head of the department, who is also the Accounting Officer to the Treasury, obtains from the various branches of his department a statement of estimated expenditure for the following year. At this point comes the first element of control over the expenditure of the Civil Service, namely, the control within each department itself. The Accounting Officer of each department passes the various estimates of the several branches within his department before they are forwarded to the Treasury, and in doing so he has to consider the demands of one branch in the light of the requirements of another, and is expected to approve and forward to the Treasury what he considers to be the reasonable requirements of his department.

The second stage of control over the several estimates is when they reach the Treasury, which examines and considers them in the light of the claims which are made by the several branches of the public service upon the revenues of the ensuing year. This is the really important stage in the progress of the estimates. The Treasury alone has before it all the materials of the case for the claims of expenditure in this or that direction. It is in a position to

Annual estimates the work of the departments,

and of the Treasury.

form an opinion of the wisdom or extravagance of any particular branch of the administration. Similarly, the Treasury alone has before it the general financial situation and the estimates of revenue versus expenditure. No doubt that which ultimately determines expenditure is the general development of national policy, and for this, not the Chancellor of the Exchequer only, but the Cabinet, is responsible. But within the broad lines of policy as determined by the Cabinet and accepted by Parliament there is no point in the whole public service which is so vital as the efficient administration of the Treasury. The third stage of control over the estimates of expenditure lies with Parliament. But the House of Commons does not by itself, or by means of any committee of its members, attempt to revise the current estimates as submitted and approved by the Treasury.

Treasury
control
over
Civil
Service.

Closely connected with the control of the estimates is the function of the Treasury in determining the size and character of the staff and establishment of departments. This function has become the more important in recent years owing to the number of new branches of the administration in the organization of which Parliament has frequently left to the Treasury a wide discretion. So far as there may be said to be a general supervisory authority over the Civil Service of the United Kingdom, this power lies with the Treasury.

Exche-
quer and
Audit
Depart-
ment.

(b) Independent of the Treasury, but closely associated with it, is the Exchequer and Audit Department, at the head of which is the Comptroller and Auditor-General, who is responsible directly to Parliament and who is irremovable except on an address from the two Houses of Parliament. This Department has two branches, first, the Exchequer branch, which authorizes issues from the Exchequer not exceeding the amount sanctioned by Parliament, sanctions borrowings in cases of deficiency, and examines the Exchequer accounts of the Bank of England and the Bank of Ireland, and the accounts of the Consolidated Fund; second, this department carries out the audit of all public accounts. It has to ascertain on

behalf of the House of Commons whether moneys have been spent by the departments in accordance with the votes of Parliament, to obtain proof as to the correctness of the accounts of the several departments, and to report annually to Parliament on any irregularities or other matters connected with the public accounts to which the attention of Parliament should be directed. But the office of the Comptroller and Auditor-General, while independent of the Treasury, is closely associated with and a necessary complement to it. The Act of 1866, which defined the functions of the office, provided that 'when-ever the expenditure included in any appropriation account, or any portion of such expenditure, is supported by the authority of the Treasury, the Comptroller and Auditor-General shall examine such expenditure with that object and shall report to the Treasury any expenditure which may appear upon such examination to have been incurred without such authority; and if the Treasury should not thereupon see fit to sanction such unauthorized expenditure it shall be regarded as not properly chargeable to a parliamentary grant and shall be reported to the House of Commons.' Thus while the Treasury safeguards the estimates, the office of the Comptroller and Auditor-General safeguards expenditure. Each of these departments stands in close relationship with the Committees on Public Accounts and on Estimates, which exercise on behalf of the House of Commons a special surveillance over the particulars of expenditure incurred.

(c) The group of departments which are subordinate to the Treasury consist mainly of financial boards and offices concerned with Civil Service supplies. These are the following: (1) Revenue and Financial Departments, viz. the Customs and Excise, the Inland Revenue, the Post Office (which is a revenue as well as an administrative department), and the Woods and Forests. (2) Contract or Establishment Departments, viz. the Office of Works for Great Britain, the Office of Works for Ireland, and the Stationery Office.

Only a brief notice is here possible with regard to these Customs

and Ex-
cise ; In-
land
Revenue.

Post
Office.

Woods
and
Forests ;
National
Debt
Commis-
sion ;
Public
Works,
&c. ;
Stationery
Office ;
Offices of
Works.

departments. Among the revenue and financial departments the most important are the Customs and Excise, and the Inland Revenue. The Customs and Excise were united in 1909. Previous to that date the Excise Department was attached to the Inland Revenue, but as Customs and Excise are two sides of revenue closely connected economically, it was considered desirable that they should be under one administrative supervision. Owing to the fiscal system of the United Kingdom, both the Customs and the Excise duties are very limited in number, the chief sources of Customs revenue being tobacco, tea, wine, and spirits, while the Excise revenue is derived mainly from spirits and beer. The Customs and Excise revenues in the year 1912-13 amounted to £71,500,000. The Inland Revenue Department deals with Income Tax, Death Duties, the Land Tax, Inhabited House Duty, Stamps, and Increment Duties, and the receipts for the year ending March 31, 1913, amounted to over £86,000,000. The Post Office is also directly under Treasury control, though the Postmaster-General represents this department in Parliament and has a seat in the Cabinet. The Post Office is only indirectly a revenue department, but in the year ending March 31, 1913, the receipts amounted to £29,175,000, while the expenditure was £23,024,000, leaving a balance of profit to the benefit of the Exchequer of £6,151,000. The Woods and Forests is a minor department, charged with the supervision of Crown lands and the collection of revenues from the properties of the Crown, the net receipts from the woods and forests and land revenues of the Crown in the year ending March 31, 1913, amounting to £530,000. Closely connected with the Treasury are also the National Debt Commissioners and the Public Works and Local Loans Authorities. Apart from these financial branches of the administration, there are also under the more immediate control of the Treasury the Stationery Office, which deals with the printing for the Public Services and the supply of stationery requirements, and the Office of Works in Great Britain and the Office of Works in Ireland—departments which,

among other duties, have charge of all government buildings and their equipment.

But within recent years new types of Treasury Boards Other Treasury Boards. have come into existence with the advent on the one hand of the Development Commission and the Road Board, and on the other hand, of the National Health Insurance Commissioners. These departments mark so important a step in the history of English public administration that it is necessary to refer particularly to their scope and character.

The Development Commission and the Road Board were created by the Development and Road Improvement Funds Act, 1909, and an amending Act of 1910. These two departments may be fittingly called super-departments, and present each a new type of public authority designed to meet special requirements with which the existing administrative departments were felt to be unable to deal adequately.

The Development Commission consists of eight members, Development Commission. not more than two of whom may be paid. The members of the Board are nominated by the Chancellor of the Exchequer, and hold office for a period of eight years, one member retiring each year. The object of the Commission is 'to promote the economic development of the United Kingdom', and to this end the Act prescribes that the Treasury may, upon the recommendation of the Development Commissioners, make advances by way of grant or loan to 'Government Departments, or through a Government Department to a Public Authority, University, College, School, or an association of persons or a company not trading for profits'. The purposes for which such advances may be made are as follows : (1) Aiding and developing agriculture and rural industries by promoting scientific research and instruction, the organization of agricultural co-operation, instruction in the marketing of produce, &c. ; (2) the promotion of forestry ; (3) the reclamation and drainage of land ; (4) the improvement of rural transport ; (5) the construction and improvement of harbours ; (6) the construction

and improvement of inland navigation ; (7) the development and improvement of fisheries. It is further provided that the Commission may make grants 'for any other purposes calculated to promote the economic development of the United Kingdom'. But it has been decided that these comprehensive terms must be read in the light of the preceding words defining the sphere of the Commission. The financial requirements of the Commission have for the present been met by a grant of £500,000 annually, for a period of five years out of the Consolidated Fund, interest on loans made by the Commission also accruing to the Development Fund. The unique character of this super-department may be seen from the procedure which has been established with regard to the making of grants by the Development Commission. Every application to the Commission for an advance must be sent to the Treasury and referred by it to the Development Commission. If the application is from a Government Department the Treasury refers the matter directly to the Development Commission ; if the application is from any other body or person the application is sent by the Treasury first to the Government Department concerned, and thereafter, with the observations of the Department, to the Development Commission. Thus, when requests for grants in aid of agricultural co-operation are made by the agricultural co-operative societies in the several parts of the United Kingdom, these requests are submitted in the first instance by the Treasury to the Departments of Agriculture in London, Dublin, and Edinburgh respectively, and afterwards forwarded to the Development Commissioners by the Treasury, with the observations thereon of the respective Departments of Agriculture. When the Commissioners have considered an application, they themselves cannot make a grant of money, but only a recommendation. This is almost without exception endorsed by the Treasury. But the Treasury, or, to put it more plainly, the Government, may for political reasons refuse to carry out the recommendations of the Commissioners.

The second Board established by the Act of 1909 was the Road Board. This Board consists of such a number of persons appointed by the Treasury as the Treasury may determine, and has power with the approval of the Treasury : (a) To make advances to County Councils and other highway authorities, in respect of the construction of new roads or the improvement of existing roads, and (b) to undertake itself the construction and maintenance of new roads. Thus in one respect the Road Board is itself a Public Works Department, while, on the other hand, it is, like the Development Commission, a superior authority to consider the recommendations received from the ordinary administrative authorities. The Road Board is provided with a road improvement grant, which is supplied from two sources : (1) the motor-spirit duties, and (2) the motor-car licence duty, as provided by the Finance Act of 1909-10 and subsequent Acts. So far the annual revenue of the Board approximates £1,700,000. The Board consists of five members, all of whom are unpaid, except the chairman, who gives his whole time to the work.

The establishment of the Road Board is an attempt to solve the relations in one sphere between local and central burdens and obligations. A charge for roads, while it falls largely upon local authorities, is frequently a charge which should be met in part from a central fund, just as it is clear that road policy is not merely a matter of local but also of national policy. Thus the Road Board, like the Development Commission, marks an important advance in the conception of the obligations and functions of the central authority as representing the interests of the community as a whole.

Still more recent is the establishment of the group of departments which have been set up under the supervision of the Treasury by Part I of the National Insurance Act of 1911. The object of this Act is to provide a system of insurance against sickness for all employed persons between the ages of 16 and 70, whose rate of remuneration does not exceed £160 a year, or who are engaged by way

Road Board.

National Insurance.

of manual labour. Insurance is compulsory and the contributions are defrayed partly by the employers and partly by the employed. Besides the system of compulsory insurance, there is also provision for voluntary insurance on the part of independent workers. To carry out this scheme a National Health Insurance Commission has been constituted in each of the four parts of the United Kingdom, with offices respectively in London, Edinburgh, Dublin, and Cardiff, while a joint committee for the United Kingdom meets in London to deal with questions of common policy. The relation of the joint committee to the several commissions is defined in regulations made by the Treasury, and the first Report on the Administration of the Act states that the principles on which the division of powers between the joint committee and the several commissions has been made are in the main three, viz.: (1) All matters involving actuarial consideration come before the joint committee, and matters which involve only actuarial considerations are dealt with by the joint committee solely. (2) Where uniformity of practice throughout the United Kingdom is considered essential, regulations are made and lines of policy laid down by the joint committee alone. (3) Where action by the several commissions requires to be co-ordinated, the joint committee act in conjunction with the several commissions. Associated with the joint committee and with the several national commissions are advisory committees, while for administrative purposes there is established in each county borough or administrative county a local insurance committee of not less than forty or more than eighty members, of whom two-thirds consist of representatives of the insured classes. In 1912-13 the number of persons insured in the United Kingdom approximated a total of fourteen millions. The National Health Insurance Commissions thus mark a step of the greatest importance not only in economic policy but also in administrative organization. With the advent of the Development Commission, the Road Board, and the National Health Insurance Commissions a new stage has been

reached in the history of the Treasury and its associated departments.

2. *Administrative Departments of the United Kingdom*

The growth of decentralization has been in recent years one of the most striking features of administrative development within the United Kingdom. But there are two great departments of state, the Home Office and the Board of Trade, which exercise a wide authority throughout the United Kingdom—though even these departments have devolved some of their functions as regards Scotland and Ireland respectively on Scotch and Irish offices. Most of the work, however, which falls to the Home Office and the Board of Trade is such as should be subject to uniform central control throughout the United Kingdom, and it is important to note that while there has been a great increase in administrative devolution the functions of these two departments, but especially of the Board of Trade, have been greatly extended in recent years.

The first of these departments, the Home Office, has a great historic position in the development of the central administration. The Home Secretary, who is the political officer in charge of the Home Office, is in rank the first of the Secretaries of State, and represents the office of the original Secretary of State. As the work of administration grew in complexity and in importance, additional Secretaries of State were established. The original Secretary disburdened himself of various duties to the respective Secretaries for War, Foreign Affairs, Admiralty, Colonies, and India, and restricted his attention to home affairs. But even within the sphere of home affairs devolution became necessary. The Board of Trade drew to itself matters affecting the relations of labour and capital, while the development of the Local Government Boards and of the Education Departments further divided the field of internal administration. So also the growth of the Irish Office and of Irish departments, and later the establishment of the office of the Secretary for Scotland led

to devolution of authority in certain matters in Scotland and Ireland respectively. But the Home Office still remains a department with a very wide range of administrative duties affecting all subjects within the United Kingdom, and the Home Secretary has been fittingly called the 'residuary legatee' of all domestic questions of administration. If a matter does not belong to any other department it belongs to the Office of the Home Secretary.

The main functions of the Home Office may be grouped under three headings : first, communications between the Crown and the subject ; second, provision for the security and maintenance of public peace and order ; third, the supervision of industrial conditions with a view to safeguarding public health.

Com-
muni-
ca-
tion be-
tween
Crown
and
people.

With regard to the first of these functions, the Home Secretary is the official through whom communications from the Sovereign pass to the people, e.g. declarations of war, the issue of warrants, letters patent, and the granting of licences. Through the Home Secretary, also, pass petitions from the subject to the Sovereign, regarding rights and liberties. In virtue of these duties the Home Secretary controls arrangements regarding the exercise of the franchise. So, too, when the subject desires to bring an action against the Crown, the procedure is to state the cause of action in a petition to the Home Secretary. Again, it is through the Home Secretary that the appeal for pardon is made to the Sovereign, and with the Home Secretary rests the duty of advising a reprieve or contrariwise. In 1907 the Court of Criminal Appeal was established which gives to the condemned person the right of appeal on the validity of the evidence. But the existence of this court, while it enables the Home Secretary to devolve some of his responsibility, does not affect the exercise of the prerogative of mercy, which still remains with the Sovereign.

Public
peace :
police.

The second function, viz. the maintenance of public peace and order, involves many duties : first, there is the control exercised over the local police forces within

Great Britain, but not in Ireland. In Great Britain the local police forces are under the charge of the municipal and county authorities, but the assent of the Home Secretary is required to the appointment of the chief constable of the county, and to changes in the number, pay, and regulations of the forces. Inspectors of the Home Office supervise the efficiency of the police throughout the country, and subject to the maintenance of a standard satisfactory to Home Office requirements, roughly one-half of the cost of the local police forces in Great Britain is defrayed by a grant-in-aid from the national exchequer. The Metropolitan Police are directly under the control of the Home Secretary, and he approves the appointment of the Metropolitan Commissioner of Police. If in any emergency the police force in any part of the country is inadequate, the Home Secretary has the duty of seeing that adequate reinforcements are sent to that district, and he may call upon other Secretaries of State to assist him in maintaining public peace.

Connected with the maintenance of the peace is the supervision of justice. The Home Secretary advises the Crown of the frequency with which assizes should be held and the adequacy of arrangements for the proper trial of prisoners. The Home Secretary has also the charge of the administration of prisons and convict stations, of reformatories for juvenile convicts, and of criminal lunatic asylums. Again, in connexion with the maintenance of public peace and order, the Home Secretary is responsible for the administration of the Naturalization, the Alien Immigration, the Extradition, and the Fugitive Offenders Acts, and has a wide discretion in granting or refusing certificates of naturalization and in controlling the movements of aliens into and out of the country.

The third function of the Home Office concerns the preservation of public health and safety in the sphere of industrial undertakings. This sphere has greatly extended the work of the Home Office during the nineteenth century. It embraces, on the one hand, the administration of the Mines Inspection Acts and the

Justice,
natural-
ization,
&c.

Public
health and
safety:
mines and
factory
inspection,
&c.

Explosive Acts, and on the other hand, the Factory and Workshops Acts, and its authority reaches not only to factories and workshops, but also to domestic industries. A select committee appointed by the Home Secretary to investigate sweating in home industries led to the passing of the Trade Boards Act in 1909; but the administration of this Act, as of other statutory provisions affecting wages, such as arbitration and conciliation, has been devolved on the Board of Trade, the Home Office retaining the regulations of the conditions of public health in factories and workshops and other places of industry. In this connexion, the relation of the Home Office to the Employers' Liability Acts deserves notice. The employers' liability is a matter for the courts, but in one important respect it lies within the field of administration, namely, that the Home Secretary has the power of adding to the schedule of 'dangerous trades', in which disease accidentally incurred during the pursuit of a trade is treated as an accident and the employer is held liable to provide compensation.

Amongst miscellaneous matters which are under the control of the Home Office are the administration of the Children's Act of 1908, regulating the sale of articles to young children, the Licensing Acts controlling the sale of intoxicating liquors and other licensed articles affecting public health, the licensing of vivisection and the control of schools of anatomy, the preservation of wild animals and game, the prevention of cruelty to animals, and lastly the regulation of aviation, which may for the present be considered more a matter of public safety than of transport.

Board of
Trade.

The second administrative department in this group which calls for notice is the Board of Trade. No Government department has seen more momentous developments within its sphere, and to-day the Board of Trade is in itself a group of departments. Originally, the function of the Board was that of advising with regard to the trade with foreign countries and with the colonies and plantations. But gradually, even in the first half of the nineteenth century, and later in a much more definite manner,

the Board of Trade assumed its character as an administrative and regulative department, entrusted by Parliament with far-reaching powers of organization and supervision. It will become more clear how great has been the extension in the scope and jurisdiction of the Board of Trade if a brief notice is made of, in the first instance, the more strictly commercial departments which, until within comparatively recent years, represented the chief function of the Board of Trade.

The oldest department of the Board is the Commercial Department, which originally was concerned with commercial treaties, tariffs, customs duties, &c. To this became attached at a later date the Statistical Branch, which compiled the statistics of imports and exports and of shipping, and has developed into a very considerable department of commercial and industrial statistical inquiry. In this connexion it may be noted that a Commercial Intelligence Branch has also been established within the Board of Trade for the purpose of collecting and distributing information to traders and manufacturers as regards foreign markets and foreign trade competition. Similarly associated with this side of the Board of Trade's activities is the Exhibitions Branch which has charge of the British and Irish sections at foreign international exhibitions. Thus a first function of the Board of Trade is to be a public adviser with regard to trade and commerce and to collect and distribute information with regard to the progress of British and foreign trade.

The second function may be said to be connected with transport. There is the Railway Department which inspects railway lines before they are opened for traffic, holds inquiries on railway accidents, and supervises railway by-laws.¹ It has also certain powers of supervising rates and alterations in the classification of charges, but the hearing and determining of cases of alleged violation of the law in respect of charges made or facilities provided by railway and canal companies is a matter for the

¹ As detailed in the chapter dealing with Communications, p. 206.

Railway and Canal Commission, which is a judicial body. The control of the Board of Trade extends likewise over shipping. The Marine Department deals with the inspection of passenger steamers, with questions of loading of cargo vessels, with the examination of masters and mates, and with other matters affecting the merchant service and the interests and welfare of seamen. Another branch, the Harbour Department, deals with matters relating to harbours, foreshores, lighthouses, pilotage, &c. The Board of Trade is thus the Department which supervises in the public interest the provisions relating to land and sea transport.

The third main commercial function which the Board of Trade discharges is what may be called the service of commercial protection. The registration of companies, the examination of bankruptcies, the supervision of weights and measures, the investigation and granting of patents, the control of trade-marks—these and many other functions are discharged by one branch or another of the Board of Trade.

Industrial
super-
vision.

The expansion of the commercial departments of the Board of Trade followed naturally on the development of commercial conditions which necessitated public organization and supervision. But this, the earlier side of the development of the Board of Trade, is almost overshadowed by the remarkable growth in the functions of industrial and labour supervision and control which have been loaded upon this department within recent years. This work may be summarized under four heads: (1) General inquiry into conditions of labour; (2) arbitration and conciliation; (3) wages boards; and (4) labour exchanges and unemployment insurance. (1) With regard to the work of inquiry into the conditions of labour, a great deal of systematic investigation has been carried out as regards employment, wages, and cost of living among the industrial classes in the United Kingdom, while inquiries have also been made as to the conditions of labour and state action in relation thereto in foreign countries. But the most important piece of organized

investigation carried through in recent years by the Labour Department of the Board of Trade has been the Census of Production of the United Kingdom (1907), which presents for the first time an approximate measure of the total output of industry and provides the machinery for future work (see Chapter VIII). (2) In the sphere of arbitration and conciliation the office of the Board of Trade has been that of a voluntary intermediary ; it has in a very tentative way discharged this function for many years, but a general Industrial Council with equal numbers of representatives from employers and employed has been set up (1911), and Conciliation Boards have been established in several industries, with a view to avoiding where possible industrial strikes and lock-outs. (3) The third line of development has been in the establishment of **Wages Boards**. In 1909 the Trade Boards Act provided that the Board of Trade may set up a Trades Board to fix a minimum wage in certain scheduled trades, and the Board of Trade is further empowered by the Act to add by provisional order to the list of trades on the schedule. When after inquiry the Trade Board has decided upon a minimum scale of wages in any scheduled trade, the Board of Trade may then make an order enforcing this scale of wages, but until they issue such obligatory order the minimum rate fixed by the Trade Board is not compulsory, though public authorities are required by the Act to give contracts only to firms who are willing to pay the Trade Board rate. Up to the end of 1912 decisions under the Trade Boards Act have been made affecting the chain-making trade, the cardboard-box industry, the lace-finishing and the tailoring trades. It is estimated that roughly about 200,000 persons, of whom about 70 per cent. are women and girls, are engaged in trades at present within the scope of the Act. Steps have recently been taken to extend the Act to five other trades, viz. the sugar confectionery and food-preserving trades, shirtmaking, hollow-ware making, linen and cotton embroidery, calendering and machine ironing in steam **Labour Ex-** laundries. (4) In 1909, also, the Labour Exchanges Act **changes.**

was passed, and to carry out the purpose of the Act a Labour Exchange Branch was established in the Labour Department of the Board of Trade. By July 1913, Labour Exchanges had been established at 430 centres in Great Britain and Ireland. In 1912 the National Insurance Act (1911), Part II, added to the Labour Exchange Branch the work of organizing 'unemployment insurance'. The Act provides for (a) compulsory insurance against unemployment in certain trades described as the 'insured trades'; (b) encouragement of voluntary insurance, through associations, in all trades. The building and engineering trades are the main industries to which so far compulsory insurance against unemployment has been applied—the number of workmen insured being about 2,250,000. The encouragement to voluntary insurance takes the form of a repayment to associations, subject to specified conditions, of a part not exceeding one-sixth of the sum expended on unemployed members. Up to July 1913, 275 associations with a membership of over 1,100,000 had been admitted as satisfying the conditions of the Board of Trade. This experiment in insurance against unemployment is one of the highest importance, but its working cannot be judged until a longer period of trial has elapsed.

The Board of Trade is thus a very complex department, entrusted with the care of many of the largest questions which a Government department can handle. It is the Ministry of Labour as well as of Trade. In Parliament it is represented by two political officers, the President of the Board of Trade, who is a member of the Cabinet, and the Parliamentary Secretary of the Board of Trade, who shares with him the work of explaining and defending the policy of the department.

3. *Local National Departments*

Secretary
for Scot-
land.

In considering the third group of departments which deal respectively with spheres of administration in England and Wales, Scotland, and Ireland, attention must first be directed to the offices of the Secretary for Scotland and

of the Chief Secretary for Ireland. These offices are the centre of the Scotch and Irish administrative systems, though the relations in which the several Scotch and Irish departments stand to them vary from that of close supervision to practical independence. The office of the Secretary for Scotland is of comparatively recent origin, having been established in 1885 to meet the demand for devolution of administration relating to Scotland. To the Secretary for Scotland were then transferred all the powers and duties of the Home Secretary except in certain specified matters, notably, the Factory Acts, Mines Acts, and Explosives Acts, various other duties relating to Scotland being transferred also from other departments. As a general rule, it may be said that in Scottish affairs the office of the Secretary for Scotland—like the Home Office in England—is the ‘residuary legatee’, and that the variety of matters which come under the supervision in some degree of the office of the Secretary for Scotland is very great. Moreover, the Secretary for Scotland is the parliamentary representative of the various Scotch administrative departments, even where, as in the Education Department, they are practically independent of administrative control by the office of the Secretary for Scotland.

In Ireland the office of the Chief Secretary is of long standing, and whereas the office of the Secretary for Scotland is in London, the head office of the Secretary for Ireland is in Dublin, and the Irish office in London is only a branch of that department for the convenience of the Chief Secretary in his parliamentary duties. The office of the Chief Secretary in Dublin has a wide range of supervision over many departments of administration, and through it pass to the Treasury the estimates of most of the Irish departments. But the most important function of this office is that it is responsible for the maintenance of law and order in Ireland, and that under its control, and not under the local authorities, are the police forces of the country. The Chief Secretary represents in Parliament the several Irish departments—except

Chief Secretary
for Ire-
land.

the Department of Agriculture and Technical Instruction, which has a vice-president who is a member of Parliament, and those branches of the administration which are directly responsible to the Treasury or the Board of Trade.

Scottish
and Irish
local ad-
ministra-
tion.

The extent to which devolution in administration has advanced, especially in recent years, is very great. It is too often forgotten in how large a measure there is to-day a separate administration for Scotland and Ireland, while the beginnings of a separate administration for Wales are already most definitely marked in the establishment of the Welsh Insurance Commission. There are separate administrative departments for England, Scotland, and Ireland in the three great spheres of Local Government, Education, and Agriculture, while there is a range of smaller boards, such as the Prisons Boards, the Lunacy Boards, the General Register and Census Offices, which enjoy also in each country an independent existence. Furthermore, Ireland and, to a less degree, Scotland have developed special departments to deal with the fixing of agricultural rents and land purchase and with the development of backward or congested districts. It is only possible within the scope of the present statement to notice briefly the more important administrative departments, viz. those which deal with (a) Local Government, (b) Education, and (c) Agriculture and Land Settlement.

(a) *The Local Government Boards*

Local
Govern-
ment
Boards for
England,
Scotland,
and Ire-
land.

There is one Local Government Board for England and Wales, another for Scotland, and a third for Ireland, each independent the one of the other. Much, however, of the law which they have to administer is in substance common, though there are also important differences in the work of the several departments. The fact of difference is indicated by the marked contrast in the estimates and expenditure of the several departments. In 1912-13, the vote of the Local Government Board for England was £283,374, the Local Government Board for Scotland £20,418, and the Local Government Board for Ireland £111,688. What is

striking in this comparison is the relatively low expenditure connected with the Scotch Local Government Board, and the very large relative expenditure on the Irish Local Government Board. The explanation is, that in Ireland the Local Government Board has a wider field of administration, and adopts a more paternal policy towards the local administrative bodies, while it has also the administration of various Acts which do not apply to England or Scotland, such as the Irish Labourers' Housing Acts and the Medical Charities Acts. In England also, as in Ireland, the Local Government Board is to a greater degree than in Scotland an inspectorial body, while both of these departments maintain a large staff of auditors, whereas in Scotland the auditors are appointed and paid by the local authorities with the approval of the Local Government Board. Nevertheless the functions of the several Local Government Boards have much in common, and in all of these departments we may distinguish three main branches of work: (1) Poor law, the Unemployed Workmen Act, 1905, and the Old Age Pensions Acts; (2) public health administration, housing and town-planning, and (3) local loans and local financial control, including audit.

(1) The powers of the Local Government Boards are very great in the sphere of poor law administration. They can dissolve, amalgamate, or create poor law unions. They inspect the workhouses and the system of outdoor relief, and prescribe and approve regulations which control the boards of guardians. They compile and publish periodic returns of the number of persons receiving poor relief, and present, in their annual report to Parliament, a survey of the state of the poor law administration. Then, under the Children Act of 1908, the Local Government Boards have special powers over destitute children. They control the emigration of children by boards of guardians to the colonies, and by means of voluntary associations they endeavour to look after the fortunes of such emigrant children. They are thus the public guardians of destitute children who are sent abroad by local authorities.

Poor Law
adminis-
tration.

Unem-
ployment,
&c.

Again, the Local Government Boards are the central authorities which deal with the Unemployed Workmen Act of 1905. In each country the approval of the Board is required before any borough or local government authority can establish a distress committee. So too, in connexion with the Old Age Pensions Act of 1908, appeals from pension officers or from claimants are made to the Local Government Boards, which are the final authority.

Public
Health.

(2) The second main sphere of the Local Government Boards is that of public health. The Boards deal with the control of infectious diseases, control the port sanitary authorities, and approve the appointment and inspect or supervise the work of the local medical officers of health and the public analysts. Through these and other local officers and their own inspectors they provide for the supervision of the public meat and milk supplies, the administration of the Food and Drugs Acts, and the settlement of questions of water-supply and problems of scavenging and sewage disposal. The Local Government Boards also administer the Housing of the Working Classes Act and the Housing and Town Planning Act, 1909, and their approval is required to schemes involving compulsory powers of acquisition.

Local
finance
and ad-
ministra-
tion :
powers
of Local
Govern-
ment
Boards.

(3) The third main function of the Local Government Boards is the supervision of the finances of local authorities. First, the sanction of the Local Government Board is required before any local authority can borrow money. Second, the accounts of most local authorities are submitted to audit either by Local Government Board auditors or auditors approved by the Board. Statutory powers require such audit in the case of the parish councils, but not in the case of municipalities which conduct their audit independently of the Local Government Board. Third, the Local Government Boards compile and publish the local taxation accounts.

Besides this financial control the Boards have large general advisory powers. They hold inquiries into local conditions of administration, and advise local authorities with regard to procedure in schemes of local development ;

they conduct scientific investigations relating to public health; they advise the Government with regard to local legislation; and, through the important procedure of provisional orders, they supervise and to a considerable extent control the progress of local legislation. They also deal with the constitution of county boroughs, the alteration of county electoral divisions, and the regulation of local elections. The work of the Local Government Boards is thus wide in range and affects very closely the daily life of the community.

It has been indicated that the Local Government Board of Ireland has certain special duties. First, there is the administration of the Irish Labourers' Housing Acts, under which about 50,000 cottages have been or are being built by local authorities with the sanction of the Irish Local Government Board. Second, in Ireland there has been established since 1851, under the Medical Charities Acts (Ireland), a system of public dispensaries throughout the country, which give free medical advice to all who apply for such assistance. These dispensaries are under the control of the Local Government Board. And third, owing to the backward conditions of many parts of the country and the necessity from time to time of considerable relief works and distribution of supplies, the Irish Local Government Board has been more paternal in its administration than the Boards of Great Britain.

Local
Govern-
ment
Board of
Ireland :
special
duties.

(b) *The Departments of Education*¹

The second group of local national departments are those which deal with education. In no sphere of public administration in the United Kingdom is there a greater recognition of national autonomy than in education. England, Wales, Scotland, and Ireland, each has its own system or systems of education. And they present marked points of contrast. It must be remembered, however, in considering the public administration of education in the United Kingdom, that beside the state-supported schools there are many independent educational foundations—not only in

National
autonomy
in educa-
tion.

¹ [On education generally, see vol. vi, chap. vi.]

what are known as the residential public schools, but in the old-established grammar schools and academies and in other institutions which are due to private enterprise. We are here concerned, however, with the state administration of education, and it will serve the purpose of clearness to treat separately each of the four countries which form the United Kingdom.

England. In England there is now one educational state department, the Board of Education, which supervises the whole educational system of England so far as it receives state assistance. The Education Act of 1902 reorganized the system of public state education. It abolished school boards and transferred the local public control of education to the municipal and county council authorities, and it brought not only the public elementary undenominational schools which had been under school boards, but also the denominational church schools, into definite statutory relations with the educational committees of the county and municipal authorities; for it provided that on the boards of managers of all denominational schools receiving public grants there should be representatives of the local public authorities. The Act of 1902 thus approached the establishment of a national system of public elementary education, in which provision for denominational education was recognized. The Act of 1902 also provided that in respect of secondary education it should be within the authority of the municipal and county authorities to provide out of the public rates provision for secondary and higher education wherever it was considered that the existing voluntary establishments did not afford adequate educational facilities. Technical and commercial education had already been, so far as provided, mainly under the local education authorities, so that elementary and to an increasing degree secondary and technical education are now under the supervision of the public state authorities local and central, while state grants to the universities and colleges are also made on the recommendation of the Board of Education.

Wales.

With regard to the organization of education in Wales,

so far as elementary education is concerned, a Welsh department, securing a very large measure of local autonomy, has been established within the Board of Education, London. But in the case of secondary education in Wales a special provision was made by Act of Parliament (1889) setting up the Central Welsh Intermediate Education Board, which has on it representatives of the University of Wales and of the county councils of Wales, charged with the provision and supervision of intermediate and secondary education in Wales. Wales may thus be said to have in substance an independent national system of education.

In Scotland the public organization of education Scotland. presents a somewhat different character from that of either England or Wales. There is a Scotch Department of Education with its head-quarters in London, and a branch office in Edinburgh, independent of the English Board of Education, and represented in Parliament by the Secretary for Scotland. In Scotland, also, the system of school boards has been maintained, responsible for elementary, secondary, and technical education. Elementary education is free, and there is on the whole a good and growing provision for free secondary education, while through bursaries provided by local foundations and by the universities, and in later years on an extensive scale by the Carnegie foundation, there is a broad high road from the secondary schools of the country to the local universities. There is thus also in Scotland as in Wales a fairly complete national system of education, the cost of which is largely defrayed from local rates and from grants made by the Central Government. There still remain, however, in Scotland a number of historic educational foundations which are independent of state aid and supervision, and which are an important asset in the work of national education.

In Ireland there is no one central department, as in Ireland. England and Scotland, representing the relations of the state to education. Three separate and independent authorities deal respectively with (a) elementary, (b) inter-

mediate, and (c) technical, commercial, and agricultural education. The National Board supervises the system of public elementary education, the Intermediate Board deals with intermediate or secondary education, while the Department of Agriculture and Technical Instruction is responsible for technical and commercial instruction, and also for agricultural education. Further, it should be noted that there are, in respect of elementary and intermediate or secondary education, no public local authorities, such as the county councils in England and Wales and the school boards in Scotland, and also no local rates in aid of elementary or secondary (other than technical) education. Elementary and secondary education in Ireland is denominational, and the various ecclesiastical bodies have their respective schools governed by their own local managers and inspected by the officers of the National and Intermediate Boards. These two Central Boards, moreover, are nominated by the Government. Thus in Ireland elementary and secondary education is not subject to any publicly elected authority other than the somewhat remote control of the Imperial Parliament.

Department of Agriculture and Technical Instruction.

The case is otherwise with technical and agricultural education. The Department of Agriculture and Technical Instruction has a very remarkable and interesting constitution. By an Act of 1899 establishing this department it was provided that there should be a statutory Council of Agriculture to advise the Department, two-thirds of which should be constituted of two representatives from each county council in Ireland, the remaining third being nominated by the Vice-President of the Department. In addition to the advisory Council of Agriculture the Act provided for a Board of Agriculture and a Board of Technical Instruction. The Board of Agriculture consists of twelve members, of whom eight are elected by the Council of Agriculture, the remaining four being nominated by the Vice-President of the Department. This Board of Agriculture has a wide control over the finance and policy of the Department as regards agriculture, including agricultural education. The Board of Technical

Instruction, which is more strictly concerned with educational matters, consists of twenty-three members, two of whom are appointed by the Council of Agriculture, while the remainder are chosen respectively by the municipal authorities, by the county borough councils, and by the Department. This Board sanctions the commercial and technical education policy of the Department. But further, the Act of 1899 provided for the establishment by the county councils of committees of agriculture and of technical instruction and similarly by the local municipal and borough authorities of committees of technical instruction, who control the local administration of agricultural and technical instruction, and who raise rates to defray, with the aid of grants from the Department, the cost of agricultural and technical instruction. Thus so far as agricultural and technical education is concerned there is in Ireland a developed system of rate-aided and publicly controlled education. At the same time the Central Department retains under its own control several educational institutions which are not subject to the local public authorities. The system of agricultural and technical instruction which has been built up in the past twelve years in Ireland presents one of the most successful and important developments in education within the United Kingdom.

It is of interest to note that the provision for education made from the public exchequer of the United Kingdom has increased rapidly in recent years. In 1894-5 it amounted to £9,766,041, in 1899-1900 to £12,181,000, in 1912-13 to £19,680,403, of which £15,183,807 went to England and Wales, £2,479,361 to Scotland, and £2,017,235 to Ireland.

Financial
provision
for educa-
tion.

(c) *Agricultural and Land Settlement Departments*

The third sphere of importance in which there has been devolution of administration is that concerning agriculture and land tenure.

In England the Board of Agriculture and Fisheries brought together various duties relating to agriculture

Board
of Agricul-
ture and

**Fisheries,
England.**

which previously had been administered by a committee of the Privy Council and by a body known as the Land Commission, while many new functions have been from time to time added to the work of the Board. The Board deals not simply with questions of agriculture, but also with tithe rents and with enclosures, while it has also the supervision of the Small Holdings and Allotments Acts, a branch of work which has considerably developed in recent years and which is likely to increase. Thus it is partly a Land Department as well as a Department of Agriculture and Fisheries. In the more strictly agricultural side of its administration the most important part of the work of the Board has been the administration of the Diseases of Animals Act, and when in 1912 the separate Department of Agriculture for Scotland was established the administration of the Diseases of Animals Acts was retained for the whole of Great Britain under the control of the English Board of Agriculture. There is, however, a separate administration of these Acts for Ireland under the control of the Irish Department of Agriculture. Another important side of the work of the English Board is the Intelligence Branch, which deals with plant diseases and pests, with experimental work in crops, and with agricultural education, while a third branch, which has long distinguished the work of the Board, is concerned with the collection and study of agricultural statistics. Until recent years, however, it may be said that, apart from the preventive and protective functions discharged in connexion with diseases of animals and plants, the work of the English Board of Agriculture has been largely advisory in character. But latterly the closer connexion with county committees of agriculture and the need for more active steps in improving the live stock and crops of the country, and especially in assisting small farmers in the organization of their industry, have led the Board of Agriculture to formulate schemes of a developmental character, and it is clear that further action in this direction must follow. The Board of Agriculture discharges very important functions, but there is still room for a wide

extension of its work, if England is to be as liberally served by its State Department as are the agricultural communities in other progressive states.

The establishment of a separate Board of Agriculture for Scotland in 1912 marks an important step in administrative devolution. The Scottish Board discharges the duties hitherto undertaken by the English Board of Agriculture (except Diseases of Animals Acts Administration), but it is required also to direct special attention to the task of ascertaining the demand for and assisting the provision of small holdings. The work of the Board will in some respects approach more closely to the active organizing and administrative character which the Irish Department of Agriculture has manifested with great success. But in two respects the Scottish Board differs as regards its functions from the Irish Board. In the first place it has to deal with the provision of land for small holdings, and in this sense is a Land Settlement Department, while in the second place the Congested Districts Board for Scotland has been abolished and its functions have been transferred to the Board of Agriculture, whereas in Ireland the Congested Districts Board has been reconstituted and its work extended by the Irish Land Act of 1909. Thus there is not a strict parallel as regards administrative functions between any of the three Departments of Agriculture in the United Kingdom. It may also be noted that, whereas in England and in Ireland the fishery administration is attached to the Board of Agriculture, there is in Scotland an independent Fishery Board which has been very active in assisting the Scotch fishing industry.

The remarkable constitution of the Department of Agriculture and Technical Instruction in Ireland has been already briefly described. The work of this great department is very far-reaching, and through its many schemes for the improvement of crops and stock and the methods of marketing produce, as also through its various provisions for agricultural education and investigation suited to the particular needs of Ireland, it has in many

Scottish
Board of
Agriculture.

Irish
Department of
Agriculture.

respects become the pioneer department in the United Kingdom as regards the development of state action in relation to agriculture.

Con-
gested
Districts
Board.

Another Irish department which must here be noticed is the Congested Districts Board, established in 1891 and reconstituted and enlarged in 1909. The congested districts of Ireland consist of a scheduled area, including the administrative counties of Donegal, Sligo, Leitrim, Roscommon, Mayo, Galway, Kerry, and parts of the counties of Clare and Cork, an area of roughly one-third of Ireland. The Congested Districts Board for Ireland was established to provide for the amelioration of the conditions of the people in these districts, to improve their agriculture, to assist the establishment and development of local industries, and to take steps to enlarge holdings and improve the land by drainage, fencing, making of roads, &c. The reconstituted Congested Districts Board of Ireland, which has received a considerably increased endowment and has been entrusted with large powers for the acquisition of land, has now as its main work the purchase, on behalf of the occupying tenants, of estates in the congested districts, and the drainage and improvement and resale to the tenants of their holdings, enlarged where necessary so as to make them economic. The Congested Districts Board has power also to assist holders by loans or grants for improving their buildings, stock, and crops, while, by means of developing the fishery and other industries, it seeks to provide subsidiary means of livelihood for the people in these districts. The Act of 1909, however, transfers to the Irish Department of Agriculture the powers and duties of the Congested Districts Board so far as they relate to agricultural training and equipment, while the fisheries administration within the congested areas is also carried out in co-operation with the Department of Agriculture and Technical Instruction, which is the central authority responsible for such work in districts of Ireland outside the congested areas.

Land
Tenure

Apart from the departments which deal with agricul-

tural development, there are the special departments which deal with the settlement of land tenure. In England and Wales there is no separate land department, whereas in Ireland there are two departments, apart from the Congested Districts Board, which deal with land settlement, and in Scotland there has been set up under the Small Landholders Act, 1911, a Scottish Land Court, which extends the fixing of fair rents to agricultural holdings of 50 acres or of an annual rental not exceeding £50 throughout Scotland, whereas previously this policy had been restricted to certain scheduled areas under the Crofters Commission. The Scottish Land Court has, furthermore, the function, on reports received from the Commissioner for Small Holdings, of making orders for the constitution of new holdings and of fixing the annual rent of the same. It will be observed that in Scotland the machinery established is concerned not with land purchase but with the provision, compulsory if necessary, of land for small holdings and the fixing of fair rents as regards certain classes of holdings.

It is in Ireland, however, that the action of the state in relation to land settlement has had much the greatest development. There have been two main lines of development in Irish land policy, viz. (1) the fixing of rents, and (2) the purchase of full ownership in the land by the occupying tenant. To carry out the first of these lines of policy there was established by the Act of 1881 the Irish Land Commission. This body was entrusted with the power of revising and fixing for periods of fifteen years the rent of holdings submitted to its decision by tenants or landlords. As a result, practically the whole of agricultural Ireland has passed through the Land Court and has had what are called 'first term' rents fixed for a period of fifteen years. A very large number of the holdings in Ireland have also had 'second term' rents fixed, and a certain number of holdings have now entered on 'third term' rents. Alongside of this development of fixing judicial rents there has been the progress of land purchase. By the Land Acts of 1870 and 1881 a few farmers were

Depart-
ments :
Scotland

Irish Land
Acts and
adminis-
tration.

enabled to purchase their holdings, but it was not until the Ashbourne Act of 1885 that land purchase was attempted on a considerable scale. Subsequent Acts of 1889, 1891, and 1896 developed gradually the purchase policy. But in 1903 the Wyndham Act marked a new stage. Hitherto land had been 'bought out' to the extent of twenty-four millions sterling. The Wyndham Act provided for the raising of money to complete the work of land purchase—a sum of £100,000,000 being indicated as necessary to this end—and at the same time set up a special board known as the Estates Commission to carry out the system of purchase as provided by the Act. In 1909 still another Land Act was passed, and an additional eighty millions has been estimated as necessary to complete the work of land purchase, the total estimated cost of land purchase thus exceeding £200,000,000. The moneys thus advanced by the Exchequer through the Land Commission and the Estates Commission are repaid by annual instalments through the Land Commission to the Treasury, apart from such sums as are contributed by the Imperial Exchequer in the form of administrative expenditure or by bonus to the landlords under the Acts of 1903 and 1909.

4. *The Civil Service Commissioners*

Civil Service :
methods
of recruiting.

Having thus considered the main branches of the central administrative services of the United Kingdom, there remains for consideration the question of the way in which the members of the Civil Service throughout the United Kingdom are recruited. In 1855 the Civil Service Commissioners were appointed for the purpose of supervising the examination and recruiting of candidates for positions in the departments of the Home and Indian Civil Services. Since that date there has been steady if sometimes slow progress in extending the system of open examination of a competitive character for the previous system of nomination to public appointments. To-day by far the greater part of the permanent Civil Service is appointed by open examination. But while

the general principle of competitive examination has been accepted as that by which the Civil Service within the United Kingdom is recruited, there has throughout been maintained the discretion to appoint to certain posts by selection based on consideration of qualification rather than by examination. And this system of selection obtains more in certain offices, such as the Department of Education, than in others. The practice holds good where it is felt desirable that persons with special qualifications and experience should be recruited for the permanent service of the State, and the number of such positions is still considerable and is likely to remain so. No examination system, however skilfully devised, is able to satisfy the requirements of an administration which is steadily becoming more complex and more responsible. The State is undertaking a very wide range of duties, for at least some of which men of experience are required whose qualification cannot be tested by any set examination.

The Civil Service thus recruited is on a permanent basis. The clerical members of the service, first, intermediate, second, and third divisions, and boy clerks, are recruited between the ages of 15 and 24, according to the grade. In the case of positions where selection is still the rule it is not uncommon to have an age limit of 35 beyond which appointments are not usually made. Civil servants are required, except under special cases of extension, to retire at 65, the maximum age limit, and may be retired at 60. The permanent positions are in most cases subject to pension, which, if the full service of 40 years has been completed, amounts to, on retiring at the age of 65, two-thirds of the current salary. There has thus been built up a body of permanent civil servants who hold in practice their appointments for life up to the age of 60 or 65, subject to good behaviour and conduct. The members of the Civil Service enjoy full political rights, save that they are required to abstain from taking an active part in any political association or from advancing political propaganda, and are not allowed to stand as candidates for Parliament. This disability is not imposed

Length
of service;
pensions;
political
condi-
tions.

by statute, but is a result of the Civil Service regulations, which enjoin that when a member of the service seeks to be a candidate for Parliament he must resign his position in the permanent service.

Division
of the
service.

Broadly, the service is divided into five main classes—the first division clerks, the intermediate clerks, the second division clerks, the third division clerks, and the boy clerks. Boy clerks retire at the age of 18 unless they have passed by competitive examination into one of the higher ranks. Members of the third division may pass by examination before the age of 20 into the second division, or be advanced in virtue of merit on the recommendation of their department with the approval of the Treasury. So again, members of the second division may be promoted by merit into the first division, though the number of such promotions is small, and it is also possible for a member of the second division to prepare himself and enter through the open competitive examination the first division. The intermediate division is of comparatively recent date, and has been instituted to meet the needs of certain offices which do not require the first division grade of clerks. The examination for the first division is based on a high university standard, and a common examination is held for candidates seeking to enter the Indian Civil Service and the first division of the Home Civil Service. The examinations throughout are provided to test the training and general education of candidates, and not to measure their special fitness and knowledge with regard to any particular branch of the administration.

Trans-
ference
of service
between
depart-
ments.

Within the service itself transfers may take place from one department to another, and especially in the lower grades the transfer of officers is fairly common owing to the varying requirements of different departments. In the higher branches of the service such transfers are less frequent, and are mainly due to changes which take place in the highest appointments of the Civil Service. Thus, when a political officer is placed in charge of a new department, or when a high officer of the Civil Service is appointed to such a position as that of the Permanent Secretary

of another department, he may secure at the same time or later the transfer of officers whose work and methods commend themselves to him. There has been within recent times a considerable number of such movements in the Civil Service, and, while open to the possibility of abuse, the practice makes for the greater vigour and elasticity of the administrative body as a whole.

The system of the permanent Civil Service, as it has grown up in the United Kingdom, is an institution of the greatest political and administrative importance.. It has provided the country with a permanent body of administrative servants who have a wide experience, and who carry on traditions that are of great value in the good government and order of the country. It has also saved the country from the uneconomic conditions of a 'spoils system', and it has given to the body of civil servants an independence and a judicial character which could not otherwise have been secured. No state which is extending the work of government and taking on the administration of new functions on the public behalf could advance steadily without such a permanent expert service. When new departments are established within the State the officers who staff them are in large measure drawn from existing departments, and bring with them the business methods and the experience of other branches of the service. True, there exists always the danger of what is known as red tape administration. But increasing publicity, the closer contact of the central departments with local authorities, and the growing practice of establishing advisory committees of a representative character, prevent departments from maintaining a position above criticism and make them much more sensitive to improvements in methods and more jealous of a name for efficient administration. It is safe to say that in recent years there has been a steady improvement in the Civil Service administration within the United Kingdom, and, corresponding with this, a marked growth in its power. It is widely recognized that the higher offices in the Civil Service are positions of great authority and influence,

Political
and
adminis-
trative
impor-
tance of
of the
service.

and they attract to them an increasing number of men of ability who find in the work of the Civil Service a career in which there is responsibility and a considerable variety of opportunity.

CHAPTER XIII

DEFENCE

THE nature of possible attacks on the British Isles and the invasion problem are dealt with in the volume on general imperial topics (VI), where it is shown that the safety of this country from oversea attack depends on our naval supremacy, combined with the maintenance of adequate land forces, to ensure that an enemy contemplating a decisive attack shall come in such strength that the evasion of the fleet will be impossible. In this article it is proposed to deal with the organization and distribution of our naval forces in home waters and our military forces in the United Kingdom, and their suitability for the task of protecting the heart of the Empire.

The
navy.

The rapid increase in the strength of the German Navy has compelled us to concentrate a very large naval force in home waters, but the alliance with Japan, our friendly relations with the United States, and the *entente* with France and Russia have enabled us to carry out this policy of concentration to an unprecedented degree, without imperilling imperial interests in other parts of the world.

Fleet
organiza-
tion in
1904.

In 1904 the fleet in home waters consisted of a Home Squadron of eight battleships of the oldest type and a Channel Squadron of six or eight battleships of more modern type, all our best ships being in the Mediterranean. A large number of ships were at that time in reserve without crews. From this date the policy of the Admiralty

has been slowly and steadily to accumulate strength in home waters, keeping in view the ultimate creation of a great home fleet under a single Commander-in-Chief, without unduly straining the international political situation.

At the end of 1904 the Home Squadron was renamed the Channel Fleet and was raised in strength by four battleships withdrawn from the Mediterranean. In the summer of 1905 this fleet was further increased by the inclusion of five battleships withdrawn from China on the conclusion of the Russo-Japanese War. At the same time, the old Channel Fleet was renamed the Atlantic Fleet, and was established as an intermediate force between the Channel and the Mediterranean. Early in 1905, also, all efficient ships in reserve were put into commission with nucleus crews and organized in three divisions at three home ports.

Organiza-
tion of
1904-5.

In 1907 the nucleus crew system emerged from the experimental stage. The Nore Division was fully manned and, combined with the other two divisions, formed the new Home Fleet, designed to bear the brunt of any surprise attack that might take place while the Channel Fleet was away on its periodical cruises. As time went on the latest and most powerful vessels were drafted into the Nore Division, and thus a concentration of strength in the North Sea was effected without unduly attracting attention.

Nucleus
crew
system.

In March 1909 the whole of the naval forces in home waters, with the exception of the Atlantic Fleet, were united in the Home Fleet and placed under the orders of a single officer. The Nore Division became the 1st Division, the Channel Fleet the 2nd Division, the nucleus crew ships the 3rd Division, and the special reserve ships the 4th Division of the Home Fleet. The principal function of the Atlantic Fleet was at that time to act as an additional fully-manned division of the Home Fleet, and for this purpose its principal anchorage was at Dover, but it remained an independent force available to be dispatched for service to the Mediterranean.

Organiza-
tion of
1909.

The
Home
Fleets in
1913.

In June 1913 the Navy List showed the organization of the Home Fleets to be as follows :

HOME FLEETS.

FIRST FLEET.

Flagship.

<i>1st Battle Sqdn.</i>	<i>2nd Battle Sqdn.</i>	<i>3rd Battle Sqdn.</i>	<i>4th Battle Sqdn.</i>
8 Battleships.	8 Battleships.	8 Battleships.	3 Battleships.
2 light Cruisers.	2 light Cruisers.	2 light Cruisers.	2 light Cruisers.

Cruisers.

First Battle-Cruiser Squadron.

5 Battle-Cruisers.

<i>2nd Cruiser Sqdn.</i>	<i>3rd Cruiser Sqdn.</i>	<i>4th Cruiser Sqdn.</i>
5 Cruisers.	4 Cruisers.	3 Cruisers.

Flotillas.

<i>First.</i>	<i>Second.</i>	<i>Third.</i>	<i>Fourth.</i>
1 Flotilla Cruiser.	1 Flotilla Cruiser.	1 Flotilla Cruiser.	1 Flotilla Cruiser.
1 Dépôt Ship.	1 Dépôt Ship.	1 Dépôt Ship.	1 Dépôt Ship.
20 Destroyers.	20 Destroyers.	16 Destroyers.	21 Destroyers.

SECOND FLEET.

5th Battle Sqdn.
8 Battleships
2 light Cruisers.

6th Battle Sqdn.
3 Battleships.
2 light Cruisers.

Cruisers.

5th Cruiser Sqdn.
2 Cruisers.

6th Cruiser Sqdn.
4 Cruisers.

THIRD FLEET.

7th Battle Sqdn.
8 Battleships.
2 Cruisers.

8th Battle Sqdn.
7 Battleships.
2 Cruisers.

Cruisers.

7th Cruiser Sqdn.
5 Cruisers.

8th Cruiser Sqdn.
(Not constituted.)

9th Cruiser Sqdn.
6 Cruisers.

10th Cruiser Sqdn.
6 Cruisers.

11th Cruiser Sqdn.
5 Cruisers.

12th Cruiser Sqdn.
4 Cruisers.

Patrol Flotillas.

6th Flotilla.
1 Cruiser.
22 Destroyers.

7th Flotilla.
1 Cruiser.
1 Dépôt Ship.
22 Destroyers.

8th Flotilla.
1 Cruiser.
1 Dépôt Ship.
24 Torpedo Boats.

9th Flotilla.
1 Cruiser.
1 Dépôt Ship.
23 Destroyers.

Submarines.

3rd Flotilla.
1 Dépôt Ship.
6 Submarines.

4th Flotilla.
2 Dépôt Ships.
7 Submarines.

5th Flotilla.
1 Dépôt Ship.
6 Submarines.

6th Flotilla.
2 Dépôt Ships.
6 Submarines.

7th Flotilla.
2 Dépôt Ships.
12 Submarines.

8th Flotilla.
2 Dépôt Ships.
10 Submarines.

Lamlash Flotilla.

1 Dépôt Ship.

4 Submarines.

The Third Battle Squadron of the First Fleet, formerly known as the Atlantic Fleet, still retains the double rôle of acting as part of the Home Fleet or of reinforcing the Mediterranean Fleet as circumstances may require. Thus during the autumn of 1912 and the spring of 1913 this squadron was detached to the Mediterranean. The gradual strengthening of the Mediterranean Fleet by the addition of battle-cruisers should in time free this squadron from the necessity of entering the Mediterranean, but in the meanwhile the Mediterranean Fleet proper has been reduced to 1 Battle-Cruiser, the 1st Cruiser Squadron consisting of 4 Cruisers, 4 light Cruisers, and 10 Destroyers, and the names of the vessels of the remaining fleets and squadrons of the British Navy are contained on a single page of the Navy List, nor is there a first-class battleship or battle-cruiser amongst them. There could be no more eloquent testimony of the trend of recent events.

The war plans of the Navy are necessarily secret, but a memorandum setting forth the views of the Admiralty on the risk of invasion was published in 1911 as an Appendix to the second edition of a book entitled *Compulsory Service*, written by General Sir Ian Hamilton. From this memorandum certain principles of naval defence can be deduced. It states that 'the main object aimed at by our fleet is to prevent any ship of the enemy from getting to sea far enough to do any mischief before she is brought to action. Any disposition that is even moderately successful in attaining this object will almost certainly be effective in preventing a large fleet of transports from reaching our shores.' It further states that if 'by some extraordinary chance the transports were able to reach our coast without being detected, their presence must be known when they arrive there; and long before half the troops could be landed the transports would be attacked and sunk by submarines which are stationed along the coast for that purpose. Besides the submarines there would be always a large force of destroyers, either in the ports along the coast or within wireless call.'

The
Mediterranean.

Principles
of naval
defence.

Naval
strategy
in time of
war.

From the above it is fair to assume that our naval strategy must be to maintain an effective watch on the exits from the enemy's defended ports, to concentrate a superior force to that of the enemy, if he puts to sea, in a position that will ensure his being intercepted before he can reach his objective, to bring him to action without delay, and to maintain a second line of defence consisting of submarines and destroyers to attack any hostile vessels that may evade the fleet. If we read this in conjunction with the principle enunciated by Mr. Julian Corbett, that as soon as the enemy plans an invasion of this country the enemy's transports, and not his battle-fleet, become the true objective of the Navy, we can obtain a fairly clear idea of the principles on which our naval defence is based.

The geographical and meteorological conditions of the North Sea impose considerable difficulties as regards the maintenance of a close watch on the exits from the German harbours, and modern developments of the mine, submarine, torpedo, and aircraft, have added very materially to these difficulties. Consequently our ability to bring the enemy to battle is less certain. The extent of our coast-line and the long undefended stretches, from Harwich to the Humber for instance, render the task allotted to our second line of defence none too easy, and emphasize the necessity for rapid and effective communication between the military watch on the coast and the naval stations for submarines and destroyers.

When these points are conceded, however, the task of planning and carrying out an attack on this country from overseas in the face of our naval superiority cannot be an attractive one to any potential enemy, and there is no reason to depart from the conclusion arrived at in vol. vi, that only raiding attacks need be feared till we have been thrown temporarily on the defensive at sea by a naval reverse or the coalition of superior naval force against us.

The army
and home
defence.

As stated by Lord Haldane,¹ the tasks that fall to the lot of the army in connexion with home defence are :

¹ Speech in the House of Lords, November 20, 1911.

- (i) To provide the garrisons of the defended ports.
- (ii) To watch the coast so as to be instantly aware of any attempted landing.
- (iii) To provide local mobile forces to get into touch with any force that succeeds in landing, and to hamper and delay its movements.
- (iv) To provide a strong central mobile force to support the local forces and attack and defeat the enemy at the earliest opportunity.

The principles involved in our land defence can be deduced from the above. Our coast-line is so extensive and the possible landing-places so numerous that it would be manifestly impossible to base our plans on the idea of opposing the enemy on the beach with a view to preventing a landing. This would entail an altogether unsound distribution of force. The watch on the coast, however, must be effective, not only with a view to putting the mobile forces in motion and the garrisons of the defended ports on the alert, but also, as already stated, to give early information to the Navy with the object of ensuring an early attack on the transports by sea. The local mobile forces fulfil the functions of advanced guards to the central force, which must hasten to bring the enemy to battle.

It is clear, therefore, that the essence of our strategy must be offensive and not defensive. There must be no occupation of defensive or fortified positions in the eastern counties, on the North Downs, or elsewhere, and no reliance can be placed on superior numbers of partially-trained troops acting on the defensive. We must attack and defeat the enemy as soon as superior forces can be concentrated for the purpose.

The strength and organization of the army at home and its suitability for the tasks indicated will now be considered, and in connexion therewith it is necessary to refer to the reforms introduced by Lord Haldane whilst War Minister of the Liberal Administration that came into office in 1906, for it was due to these reforms that it became possible to base our defensive dispositions on land on the principle of counter-attack.

Army
organiza-
tion :
Lord Hal-
dane's
reforms.

When Lord Haldane took office he found the Regular Army at home organized in eight Divisions of two Infantry Brigades each, with Divisional Artillery, but these Divisions were not all capable of taking the field at the outbreak of hostilities, owing to imperfect plans for mobilization and the lack of certain units of the administrative services. Lord Haldane organized from the Regular Army at home a Cavalry Division of four Cavalry Brigades, two Mounted Brigades of Cavalry and Mounted Infantry, and six Divisions of three Infantry Brigades each with Divisional Artillery, and Army Troops; gradually completed the administrative services for these formations; improved mobilization arrangements, which were very defective, notably as regards horse supply; fostered the efficiency of the army by a liberal training grant, which provided amply for an adequate system of manœuvre training, and, in fact, fashioned a highly efficient fighting machine. Unfortunately, he was compelled to make considerable reductions of units for financial reasons in order to carry out his reforms, so that while the Regular Army at home is universally recognized as being better organized and more efficient than it was, it is numerically weaker.

The
Special
Reserves.

The Militia was transformed into the Special Reserve, the conditions of service being changed to include liability to service abroad in time of war, and the training being increased to six months' training on enlistment and twenty-eight days' annual training. The primary function of the Special Reserve is to provide drafts for fighting units to make good the wastage of war, and to complete certain units on mobilization, such as ammunition columns, for which the Army Reserve is inadequate, and the duties of which can be carried out without necessarily undergoing a prolonged period of colour service. The force can only be said to be a qualified success. The men are certainly better trained than the old militia, but the force is about 590 officers and 15,900 men below establishment, and many of those serving are undersized youths who have not attained the age that would fit them for foreign service.

But Lord Haldane's chief reform was the transformation of the old Volunteers into the Territorial Force. The Territorial Force when embodied, or out for training, is subject to military law, and the men undertake a definite liability to serve and train, subject to certain pains and penalties. The annual training is 15 days, or 8 days with leave from the commanding officer. A recruit does 40 drills on enlistment, and a trained soldier 10 drills and a musketry course annually in addition to the annual training. The Force, unlike the old Volunteers, which were immobile, is organized into 14 Mounted Brigades of Yeomanry and 14 Territorial Divisions, equipped and supplied with administrative services to enable them to take the field. The organization of the Mounted Brigades and Divisions approximates as closely as circumstances permit to that of similar formations of the Regular Army. The Force, according to the return of June 1, 1913, is 1,927 officers and 59,705 other ranks short of its establishment, and it is apparently contemplated to fill up the deficiencies from the newly-formed National Reserve, a semi-military body consisting of men who have performed some military service, but who undertake no definite liability in the event of war.

On a general mobilization taking place there would be, therefore, in this country, when it was completed :

- 1 Cavalry Division of 4 Mounted Brigades,
- 2 Regular Mounted Brigades,
- 6 Regular Divisions,
- 14 Territorial Mounted Brigades,
- 14 Territorial Divisions,

or a force of not far short of 400,000 men nominally fully equipped and ready to take the field.

In the speech referred to above, Lord Haldane gave a pretty clear indication of the distribution of the available forces between the garrisons of the defended ports, local mobile forces, and the central force. He stated that the Regular Royal Garrison Artillery and Royal Engineers man the fixed defences of the defended ports, and that the Special Reserve battalions, having absorbed the unfit left

The
Terri-
torial
Force.

General
mobiliza-
tion.

Theory of
distribu-
tion of
forces :
the Ex-
pedition-
ary Force.

behind by Line battalions and the surplus Army Reservists, will form the bulk of the infantry garrisons of defended ports. He further stated that 11 Mounted Brigades and 10 Divisions of the Territorial Force are allotted to the local mobile forces, and that 3 Mounted Brigades and 4 Divisions of the Territorial Force form the Central Force, which might include some portion of the Expeditionary Force if, when the necessity for taking expeditionary action arises, the Territorial Force is not considered capable of undertaking the duties of home defence unaided.

Criticism
of the
scheme.

These arrangements have been the subject of much hostile criticism in Parliament and the Press. The points usually emphasized by the critics of one school are that the Territorial Force is greatly below establishment, and that it is inadequately trained to carry out its duties on the outbreak of war, which necessitate the adoption of a vigorous offensive, for which it would not be fit. They point out that the critical time as regards home defence may well be during the first few days of hostilities, or even before war is declared, and that the Territorial Force cannot count on time in which to perfect its training ; that the condition of the Force weakens our power to defend the Empire abroad by tying a portion or possibly the whole of the Expeditionary Force to these islands for an indefinite period ; that the decisive point in any great campaign in which we may be involved will almost certainly not be within the United Kingdom, and that the principles of strategy necessitate the concentration of the maximum force at the decisive point ; and, finally, that disaster may result from defeat at the decisive point owing to the fact that the weakness and inefficiency of the Territorial Force will preclude the adoption of a sound strategical plan of campaign.

The critics of another school, voiced by the National Service League, are never weary of the attempt to frighten the public as to the danger that threatens their hearths and homes from invasion. They consider the danger imminent and the folly of the Government in not providing against it by the introduction of compulsory service criminal.

Broadly speaking, the division of opinion lies between those who ask for large numbers of partially-trained troops for home defence and those who would prefer fewer men thoroughly trained available for service in any part of the world where the vital interests of the Empire may be threatened. There are advocates of the principle of compulsion on both sides, and the conditions of service proposed vary from the four months' preliminary training and fifteen days' annual training of the National Service League, and two years' training with the colours on the lines of Continental armies.

The views expressed in the general volume, in which the problems of imperial defence are discussed, indicate the desirability of considerably increasing the strength of the army, but the case cannot be based on the claims of home defence. The ideal army would be one that would allow us to concentrate a field army of well-trained troops in any theatre of war where the vital interests of the Empire may be threatened of sufficient strength for our purpose, and to provide, at the same time, for the defence of the home country. What the strength of the field army should be can only be calculated by the Government of the day, who alone have access to information on which such calculations must be based, and the relations of European Powers and the balance of forces vary so from time to time that it is a task of considerable difficulty to find any permanent basis on which to work. The principal problems, as shown in the general volume, are the maintenance of the balance of power in Europe, the defence of India, and home defence. The great difficulty of our military administrators arises from the fact that the conditions of service that would be suitable in one case, say for home defence, would be quite unsuitable in another, say the defence of India. Compromise of some kind is therefore essential, and there is no possibility of aspiring to the ideal. The War Office must cut its coat according to its cloth, which is represented at present by the voluntary principle and Army Estimates approximating to £28,000,000 annually.

Summary
of problems of
imperial
defence.

Com-
pulsory
service.

In spite of Lord Roberts's fervent campaign it can hardly be said that compulsory service is yet a practical political issue, though it continues to gain adherents. If its advocates are eventually able to persuade the people of this country that it is an essential principle and the people are willing to adopt it, the task of applying the principle to the needs of defence will be no light one, and it would be nothing short of a disaster to the efficiency of Imperial Defence as a whole if funds were to be diverted from the Navy and the oversea army for the maintenance of a large, unwieldy, partially-trained home defence force.

CHAPTER XIV

TOWN LIFE AND ADMINISTRATION

By R. C. K. ENSOR

England
and
Wales :
increase in
urban
popula-
tion.

THE census of 1911 showed 78·1 per cent. of the English and Welsh population to be living in urban areas. This may be compared with 77 per cent. in 1901 and 50·2 per cent. in 1851. The tendency thus shown has been operating continuously since about the middle of the eighteenth century, before which there were only two large English towns, London and Bristol, and the mass of the people were villagers. Their principal occupation was agriculture, and the exceptional freedom from invasions and devastating wars, which they had enjoyed for centuries, had left them with no motive for crowding into fortified towns, as was done on the Continent. The fact is important, because when the Industrial Revolution at last drove them townwards, there was scarcely any effective inherited tradition of urban life and administration, such as, in Germany, the Low Countries, and elsewhere, has descended without break from the Middle Ages and facilitated the solution of modern town problems.

1. *Origins and Types of Towns*

We may distinguish in England and Wales to-day the following main types of towns :

The first were the typical English towns before 1750, and are mostly boroughs, which had ancient unreformed corporations prior to the Municipal Corporation Act, 1835. A nucleus of population and employment is afforded by county offices, a cathedral, a long-established market for farmers, an endowed school or charities, or usually by several of these factors combined. To these there commonly come to be added a residential contingent of unoccupied gentry, some streets of shops, and a few localized industries, such as brewing. In ordinary cases the population ranges from 6,000 to 30,000. Occasionally special educational, railway, or residential features carry them to 50,000 or 60,000, as at Oxford, Cambridge, Bedford, Rugby, and Bath; and in still rarer instances the ancient town, without losing the predominance of its original character, swells into a great modern manufacturing centre, as at Norwich, Lincoln, and York.

The English and Welsh coasts are much indented, and remarkably rich in harbours suitable for small craft. Down to the eighteenth century the trade of the country was scattered over many little ports. A great number of these survive as small ancient boroughs, such as Barnstaple, Lyme Regis, and Rye, which in some cases are no longer accessible even to small ships. The concentration of trade into a few large ports began towards the close of the seventeenth century with the growth of London and Bristol. It was continued in the eighteenth, when the great port of Liverpool came into being. In the nineteenth century the transformation of a great proportion of the country's shipping into 'lines' of steamers completed the tendency. Under modern conditions the vast bulk of trade is confined to half a dozen ports, though the joint enterprise of railway and steamship owners occasionally develops new small harbours, and the deeper draught of modern vessels has brought

(1) Ancient administrative, ecclesiastical, and market centres.

(2) Ports.

into being what may be termed subordinate ports a few miles seaward of the great ones, such as Avonmouth for Bristol and Tilbury Docks for the Port of London.

Sub-types of ports are (*a*) naval bases, (*b*) fishing centres. Naval bases have certain features of their own, particularly the dependence of the population upon Government expenditure, and the existence of high naval and military authorities alongside of the ordinary civil authorities. The latter feature, however, is far less conspicuous than in Continental garrison towns. Fishing centres, if more than large villages, depend (with the single exception of Grimsby) more on other industries than on fishing, especially on that of letting seaside lodgings.

(3) Manu-
facturing
centres.

The third type forms the majority of large English towns, though not the largest. In the English Industrial Revolution three stages may be traced: first, the aggregation of workers in factories without power machinery; second, the introduction of power machinery; third, the introduction of steam power. In the first stage factories grew up in towns which were markets for their raw material. For instance, Newbury (Berks.) became an important early centre of woollen manufacture, and Witney (Oxon.) of blanket-making, because of their importance as markets for fleeces. In the second stage the factories required power, and the most important known was water power: hence they were built along swiftly-falling streams, such as are particularly common in the cloughs of the Pennine Chain in East Lancashire and the West Riding of Yorkshire. The third stage made coal the decisive factor. Manufacturers increasingly sought after sites either on the coal-fields or on canal banks or harbours where they could obtain water-borne coal. In this stage the industrial advantages of urban concentration were first felt fully. Only less important than the invention of the steam-engine was the discovery of successive processes for using coal to smelt iron and steel on an enormous scale, discoveries which still further crowded the population into the cheap-coal districts. Traces of all the three main stages are still visible. The industries of the first stage,

it is true, are for the most part dead, or, like the once famous West of England cloth industry, the shadows of their former selves; yet if one asks, for instance, why Northampton is a great boot-making centre or High Wycombe the centre for British chair-making, it is to the first stage that one must refer. The effects of the second stage are writ larger; it explains why the textile centres of Lancashire and Yorkshire mostly cling to the skirts of the Pennines, and are comparatively so far from the richest sources of coal in their respective counties.

Towards the end of the nineteenth century gas-engines and electric power began increasingly to supplant or supplement steam-engines in factories; but as both in England practically always depend on cheap coal, they have scarcely affected the distribution of the people. Manufacturing towns may be broadly classified under the following sub-types: (a) Towns otherwise not unimportant, in which the growth of manufactures has dwarfed their other features. Such are, for instance, Leicester and Nottingham, old county-towns now overwhelmingly concerned with manufactures. (b) Towns which have grown up entirely as modern manufacturing towns. Such are nearly all the cotton towns in Lancashire, most of the cloth towns in the West Riding, the Black Country towns, the towns (except Newcastle) along Tyneside, and some of the railway-works towns, e.g. Crewe, Swindon, and East-leigh. (c) Mining towns. These might be grouped with the last named, but have marked peculiarities of their own. One is that since pit-heads cannot be grouped together quite as factories can, these towns are usually much spread out. The other is that as nobody wants to live near a pit-head after the mine is worked out, and as modern improved working constantly shortens the lives of mines, building in such towns is peculiarly speculative, and there is usually a house-famine; often very severe, with degrading social consequences. In some of these towns the sanitary, social, and aesthetic evils resulting from mushroom growth, often extremely bad in towns of the (b) sub-type, are seen at their worst.

Classification
of
manufac-
turing
towns.

(4) Mercantile centres.

A fourth type is that of the few very large cities, in which the great middlemen and wholesalers buy and sell the products and requirements of the country's staple manufacturing industries. These cities are usually overgrown manufacturing towns, whose factories have gone out to the suburbs or to lesser neighbouring centres; sometimes they are great ports. As the amount of capital employed in mercantile operations, and the rate of profit earned, are perhaps scarcely inferior to those in actual manufacturing, and as they are concentrated in far fewer towns, these are the largest and richest in the country. Besides their exchanges and warehouses, they naturally become the chief banking and shopping centres. Omitting London, the largest and perhaps the most typical is that of which the bulk is comprised in the twin county boroughs of Manchester and Salford, which is the second largest urban agglomeration in the kingdom. Originally a town of textile factories, it now has relatively few of these, but is the mart at which most of the yarn and piece goods produced in Lancashire are sold. Besides a most valuable central square mile of warehouses and banks, it has in its outer districts enormous subsidiary industries—engineering, textile machine, chemical, and dye works, &c., as well as a large artificial port, created through its ship-canal. Birmingham stands in much the same relation to the numerous metal and hardware trades of the West Midlands; so does Newcastle to Tyneside; so (though its headship is partly shared with Bradford) does Leeds to the West Riding. Of the English ports (excepting London) Liverpool and Bristol exhibit most of this mercantile character.

(5) Residential towns.

Neither ports, nor manufacturing towns, nor mercantile cities are under modern English conditions very pleasant or healthy to live in. People who have not business in them usually wish to live somewhere else. Ever since the conquest of India and the Industrial Revolution, there has been a growing class of well-to-do unoccupied people, whose property is not in land, and whose taste for country life is limited, but who do not wish to live in the towns

where money is made. Such people may live in London, or may settle in one of the more attractive old county or cathedral towns ; but a great feature of modern England has been the development of special towns for them. These are naturally situated in places supposed to be specially healthy. They began in George III's reign with the development of the inland watering-places, Bath and Tunbridge Wells, to which that of Cheltenham, Leamington, Buxton, Matlock, and Harrogate has been added—mainly during the nineteenth century. The idea of seaside watering-places came later (though Brighton and Weymouth are Georgian), but in the nineteenth century they grew enormously along all the English coasts, especially the Channel coast, which enjoys most sunshine. The custom enjoyed by a seaside town may be of three kinds—that of trippers who come for the day, that of visitors who stay for a holiday in hotels or lodgings, and that of well-to-do residents who make homes there. While nearly all seaside towns enjoy some of each kind, the proportions in which they do so vary greatly, and have a great influence on their character. Those which, like Bournemouth and Eastbourne, have a strong residential element often become relatively considerable centres for education, the churches, the theatre, music, &c. In municipal administration the residential towns rank among the best in England. Depending for their custom on health and amenities, they engage some of the very best Medical Officers of Health ; and their public enterprise in pursuit of beauty and order is a great contrast to the squalor, disorder, and unregulated development which characterizes, with few exceptions, the English business towns.

The growth of the larger towns, combined with in- (6) Sub-
 creased facilities of transit and transport, has caused an
 enormous development of suburbs. In the days of no
 railways and bad roads these scarcely existed in the
 modern sense. In 1736, when London was already a
 very populous city, Lord Hervey at Kensington could
 write that 'the road between this place and London is

grown so infamously bad, that we live here in the same solitude as we should do if cast on a rock in the middle of the ocean'. The towns ringing Manchester, which every year become more suburban and dependent on it, were originally quite separate growths. Trains were at first too expensive to make much difference save to wealthier merchants, such as resorted to Mrs. Gaskell's *Cranford*. The earliest big factor in creating popular suburbs was the horse-tramway, which spread rapidly after the Tramways Act, 1870. Mr. Chamberlain's Cheap Trains Act, 1883, gave a further stimulus. But the greatest effect was produced between 1895 and 1910 by the rapid development of electric trams, electric trains, and (in London) motor omnibuses.

Classifica-
tion of
suburbs.

Suburbs fall under two broad sub-types: (a) residential, (b) industrial. Where they are not administratively part of the cities upon which economically they depend, they are, with some exceptions, perhaps the worst-governed areas in England. This is partly because they are under authorities too small and poor to employ the best officials, partly because local public spirit has not had time to develop. The case is the more serious, because at any time the immediate future of English urban development lies largely in these areas. For administrative and financial reasons the big cities have increasingly sought to absorb them into themselves; but Parliament and the Privy Council, influenced more by traditional maxims as to the independence of local authorities than by any knowledge of or care for administrative efficiency, have regularly thwarted them. A series of leading cases ranging from that of Liverpool and Bootle (1868) to those of Brighton and Hove (1898) and Bradford and Pudsey (1899) have established that no borough, and practically no suburban local-governing area, can be amalgamated with another against its will. Amalgamation can thus only take place by consent; and although in the early years of the twentieth century some large voluntary amalgamations were effected in the cases of Birmingham and the Potteries, and more partially in that of Man-

chester, the method is but seldom successful, and scarcely ever until after separate suburb-government has for long years wrought great and often irreparable mischiefs.

London, whether by that name is meant the area under the London County Council (population by the 1911 census 4,523,000) or that of Greater London (population by the 1911 census 7,252,000), is a type by itself containing and transcending nearly all the others. It is the chief political, administrative, legal, mercantile, banking, shopping, entertainment, and religious centre in the country. Greater London contains also the largest port, the largest manufacturing population, the largest residential population, and the largest suburbs. A combination of all these features on so vast a scale has necessarily an abnormal result; but its abnormality has been further accentuated by the unique system of local government adopted for it.

(7) The
Metropolis.

2. *Types of Town Councils*

An English town, except in the metropolitan area, is always locally administered either by (a) a county borough council, (b) a borough council, or (c) an urban district council. In the last two cases, but not in the first, the control of the council does not extend to all local services, but some are carried on by the county council of the county in which the town is situated.

A county borough may be described as forming a county as well as a town by itself. Any borough whose population exceeds 50,000 is by practice entitled to the position; though the county councils, which lose a valuable source of revenue every time that a borough becomes a county borough, have on occasion protested, and in 1913 unsuccessfully approached the Prime Minister on the point by deputation. The council of an ordinary county borough is the sole local public authority within its area for (among other things) the maintenance and cleansing of roads and streets, the administration of the Public Health and Housing Acts, education, police, fire brigade, lighting, water-supply, tramways, improvements, parks,

(a) County
boroughs.

museums, public libraries, baths, washhouses, lunatic asylums, and cemeteries, to which tasks the provision of gas and electricity is often added. It has also a host of minor duties or powers, e.g. those of inspection under a number of Acts, or of providing fever hospitals, or reformatory schools.

(b) Borough
councils.

A borough council has the same powers and duties *minus* certain which it must relinquish to the county council of its county. If it has less than 10,000 inhabitants it must relinquish in this way education, police, and most of the miscellaneous inspection work. Unless it has a quarter sessions, it must relinquish the provision of lunatic asylums. In all cases it is without the right to maintain main roads, and its inhabitants must contribute to the county council for the maintenance of main roads throughout the county, though this matter is often settled by a pecuniary arrangement between the two councils. The county council is also the authority for secondary education.

(c) Urban
district
councils.

An urban district council has practically the same powers as a borough council, save that it never controls the police, and does not control even elementary education, unless its area has over 20,000 inhabitants. It differs from a borough council in that it has no aldermen and its councillors can be all elected triennially, instead of its having every year a third of them elected to sit for three years; also in that its head is called a chairman instead of a mayor and lacks the chain, robe, and other dignities of the mayoral office. Partly for this last reason the urban district councils are remarkably poorer in prestige. Often governing large populations (sometimes over 100,000), and nearly always in charge of districts at their most critical growing stage, these obscure, unadmired, almost unregarded bodies tend to attract a minimum of public interest and attention just where a maximum is required.

The transformation
from one
to another.

So far we have in theory a tolerably plain hierarchy. At the top the largest towns are formed into county boroughs, wholly emancipated from county council con-

trol; next come the boroughs, not quite emancipated; and last come the urban districts, with less autonomy, representing the first stage in urban, as opposed to rural, local government. But in practice things are not so symmetrical. There are often in existence urban districts much more populous than many county boroughs. There are always in existence a very large number of boroughs with less population than many, and perhaps most, urban districts. The distinction between boroughs and urban districts is historical in each case and very arbitrary; often an urban district has not become a borough till long after it has reached the size which would have qualified it, if a borough, to be a county borough.

Here we may briefly mention how each is brought into existence. A new urban district is constituted by the Local Government Board, under the provisions of the Public Health Act, 1875, as modified by the Local Government Act, 1894. To become a borough it must obtain a charter, for which it must petition the Crown. By the Municipal Corporations Act, 1882, such petitions have to be referred to a Committee of the Privy Council, which must consult the Home Secretary and President of the Local Government Board, and stands, in practice, for the Government of the day. If the Committee report in favour of the charter, further opportunity is given for opposition; if none appear, the charter is given by Order in Council; but if it is opposed, it must be referred to Parliament. A borough desirous of becoming a county borough has two courses open to it—either it may promote a private Bill to that effect, or, under a cheaper but slower method introduced by the Local Government Act, 1888, it may obtain a Provisional Order. It may be observed that the first step in the whole series, the constitution of the urban district, is the only one in which the initiative is taken by the Local Government Board, i.e. by the central government. The Board's attitude towards the further stages is that of a critic. When an urban district becomes a borough, its council's accounts cease to require a Local Government Board audit, and are subject only

to that of elective auditors chosen by its burgesses. Partly for this reason, and partly on account of a certain conservative jealousy which is traditional in the Department towards municipalities, the Board's assent has, as a rule, been tardily and reluctantly given to the creation of new boroughs.

The administration of London.

The great exceptions to the general scheme of urban local government in England are provided by the metropolitan area, whose total population in 1911 formed more than a fifth of the population of England and Wales. Throughout the nineteenth century the legislature subjected it to separate and anomalous schemes of administration; and in 1889, what have since become only its more central portions were formed into the 'county of London', an area of about 117 square miles, with a county council exercising many of the powers of a county borough council over a population which in 1911 numbered 4,523,000. This county council has become the single authority for education, main drainage, fire brigade, and many branches of inspecting work throughout its area, and, except in the City of London, for lunatic asylums, tramways, and bridges. It is also the principal authority for parks, large improvements, and work under the Housing of the Working Classes Acts, as well as for a host of minor services. But, unlike a county borough council, it has other local elected authorities within its borders, who are entrusted with some of the most important local functions. These are (1) the Corporation of the City of London, an ancient unreformed body which the successive Municipal Corporation Acts of the nineteenth century spared, and which within a central area of about one square mile discharges nearly all the ordinary functions (excepting education, but including police) of a borough council; (2) twenty-eight 'Metropolitan Borough Councils' created by the London Government Act, 1899, and having jurisdiction over areas whose populations in 1911 varied from 49,357 in Holborn and 50,659 in Stoke Newington to 311,360 in Wandsworth and 327,403 in Islington. These twenty-eight councils have each a mayor,

aldermen, and councillors, much as do ordinary borough councils, but their functions are far more restricted; they are however considerable, comprising nearly the whole of the administration of the Public Health Acts, the maintenance and cleansing of all streets except certain main roads, and many minor matters, such as libraries, baths, and washhouses. In respect of public health the London County Council, which has also a Public Health Department, is supposed to exercise a supervisory control over the borough councils, but, as no means have been provided for making it effective, it remains nominal. The borough councils have to apply to the London County Council for loans, but the discretion of the latter to refuse them cannot be used arbitrarily. On the other hand, the borough councils have several means of harassing the county council. One much used has been their so-called 'tramways veto', whereby any metropolitan borough council can absolutely prevent the London County Council from laying a new tramway across any of its area, except on the borough council's terms.

This dual system was set up in the county of London upon the ground that its area and population were too large to be administered entirely by one central body. It is defended as being democratic and giving free play to local interest. It is criticized as being inefficient and costly, and also as involving great inequality of financial burden as between different metropolitan areas. The latter evil, which is enhanced by the subdivision of the county for poor-law purposes, has been mitigated by Acts of 1867 and 1894, establishing a Common Poor Fund and a Rate Equalization Fund for London. But the inequalities are still marked. For instance, in 1912-13 the local taxation of the City stood at 6*s.* 5*d.* in the £ on the rateable value, that of Westminster (St. James's Parish) at 6*s.* 4*d.* in the £, and that of Kensington at 6*s.* 10*d.* in the £; while among the poorer districts it rose to 8*s.* 11*d.* in the £ for Bermondsey, 8*s.* 8*d.* in the £ for Camberwell, 8*s.* 10*d.* for Woolwich, and 11*s.* 3*d.* for Poplar.

Other metropolitan anomalies are numerous. The

Dual administrative system in the county of London : inequality of rates.

Separate special

adminis-
trative
bodies and
areas.

greatest is that the police, which elsewhere throughout England are controlled by the local authorities, are here a special force under a Commissioner responsible to the Home Office, i. e. to the central government. This is so not only in the county but throughout Greater London, the City of London alone excepted. Again, the water-supply of the county and most (though not all) of the Greater London areas was, by the Metropolis Water Act, 1902, entrusted to an entirely anomalous Water Board, composed of sixty-six members chosen by over 50 different authorities. Again, the provision of isolation hospitals is undertaken in London by an anomalous Metropolitan Asylums Board, somewhat similarly made up of the nominees of the thirty-one London Boards of Guardians and the Local Government Board. And there are many other examples. What they show is that the legislature has constantly regarded London as requiring, on account partly of its size, partly of its metropolitan character, a system of local government differing materially from that of the other English towns. How far the differences were necessary in the circumstances is matter of controversy; but there can be no doubt that their general tendency has been to diminish popular control over the local services, and also to increase their cost.

Variations
of town
govern-
ment.

Outside the metropolis, the variations of town government from the normal are mainly a matter of history, and seldom of more than picturesque interest, e. g. some towns are entitled to be called 'cities', because they are the seats of bishops, or because the Crown (as in the cases of Sheffield and Cardiff) has granted them the title. In a few the mayor is entitled 'Lord Mayor'. Some eighteen boroughs, which had sheriffs of their own before the Municipal Corporations Act, 1835, and have still, are quaintly termed 'counties of cities' (or 'of towns'). Some rather more material variations affect the administration of justice. Thus in any borough, and any urban district of over 25,000, the Crown may, if petitioned, appoint a Stipendiary Magistrate to do the criminal work of petty sessions. This, which means nothing less than the sub-

stitution of a paid trained judge for unpaid untrained ones, is still relatively rare. More common, because gratifying to the ambition of local councillors, is a separate Commission of the Peace, which on petition may be granted to any borough by the Crown. Some boroughs have also a separate court of quarter sessions; whose judicial work, unlike that of a county quarter sessions, must be done by a 'Recorder'—a barrister appointed by the Crown and paid by the borough.

3. *Constitution and Practical Working of Town Councils*

All English municipal councils have certain broad features in common. All consist entirely of unpaid members, chosen without any expert qualification. All employ a paid staff, partly clerical, partly technical, to carry out their decisions. All decide their policy through the committee system shortly to be described. All, so far as they seek additional revenue by taxation, have but a single tax which they are empowered by the State to impose—the 'rate', or tax levied on the assessed annual value of buildings and land. The first, third, and last of these features are practically confined to the United Kingdom among European countries. The third is perhaps the most interesting to a student of institutions, forming as it does an elaborate and spontaneously-evolved alternative to the Cabinet system which has been developed at Westminster, and the various bureaucratic systems adopted in continental towns.

The council of a borough (of any kind or size) consists of a Mayor (or Lord Mayor), aldermen, and councillors. The latter alone are popularly elected; they each sit for three years, and a third of them are elected every year; so that at any given time the electorate can only change at most a third of the elected persons. The municipal voters in London and in urban districts include all who have votes for Parliament (i. e. owners and 'lodgers' as well as occupiers); but in boroughs only the resident (within seven miles) and rated occupiers of rateable property

Constitution
features.

Town
Councils :
member-
ship.

The
Mayor.

within the area. Women, if qualified as resident occupiers, have votes in both cases; marriage formerly disqualified them in boroughs, but since the passing of the Qualification of Women Act, 1907, some revising barristers have allowed married women's votes even there. The aldermen are elected by the councillors; they each sit for six years, and their number must be one-third of the councillors. They are not chosen for any expert qualification, nor paid any salary, nor do they form any kind of second chamber, like the *Magistrat* of a German town. Most (though not all) councils choose their aldermen from among the councillors; some practically promote the latter in a rota according to seniority. Most regard the aldermanships as party perquisites and rewards; comparatively few use them as a means for strengthening the council with able men from outside the party arena. As the aldermen are chosen on the morrow of an election of councillors, an important leader defeated at the polls is often restored to the Council in this way. The Mayor is elected by the aldermen and councillors. His office is annual; in small towns, where men suitable for it are few, he is sometimes re-elected year after year; in larger towns, where it is more sought after and entails expense on the holder, he is usually content with once holding it. He represents the council on ceremonial occasions; he presides at its meetings; and he is an *ex officio* member of all its committees. But he has no special executive powers; and it is even difficult for him while Mayor to influence markedly the policy of the council, because his position in the chair carries with it an obligation not to take any party line. He thus is very unlike such different types as the German, Belgian, French, or American Mayors; he is really modelled on the British monarch, who reigns and receives honour but does not rule. The expense which he must meet for entertaining is often very heavy, and in a few of the larger cities a municipal contribution is made towards it; but there is never question of a salary in the true sense, though the boroughs have power to pay one. The Mayor (unless a woman) is

a justice of the peace, and presides over the borough bench of magistrates during his year of office.

If a town is an urban district, its council, as we have seen, has no Mayor and no aldermen. It merely elects a chairman, who as such has practically no public status. The London County Council, which in some respects may be regarded as the premier English municipality, has likewise no Mayor; but it has aldermen, of the same type as a borough's but half as numerous. An important distinction is that the whole of its councillors retire simultaneously once every three years. The same is the case with the Metropolitan Borough Councils. It is thus possible, and indeed not unusual, as in the case of Parliament, for the electorate to make at one stroke a complete change in the dominant party and policy. The continuity, which is characteristic of borough councils, is thus much diminished, and party spirit much accentuated. Urban district councils may, and many do, adopt this system. On urban district councils it has been possible ever since their inception for women to sit. The Qualification of Women Act, 1907, enabled them (whether married or single) to sit on borough councils and the London County Council; though as a councillor must be a voter, and it is difficult for most women to be municipal voters, the extension gave less than might appear. Comparatively few women have been elected either as councillors or as aldermen; but those who have been have in nearly every case served with marked credit. The first important town to choose a woman for its Mayor was Oldham (1910).

Urban district councils and L.C.C. chairmen.

Women on town councils.

Thus the councils are constituted entirely of lay or non-expert persons. In England the place of the qualified expert is not on a council, but on its staff. At the head of every municipal staff is the Clerk (usually a qualified solicitor). The council's clerical employees are under his more immediate direction, but he exercises a certain overlordship over the other chief officers, who may be many or few and have large or small departments under them according to the size of the town and its council's

Staff and departments.

powers. Certain officers are required to be appointed by statute. Every town council must appoint a Treasurer, who must be a different person from the Clerk. In a small town it often appoints to this office the manager of, or a partner in, some bank; in larger towns there is a full-time officer, who combines the positions of Treasurer and Accountant, and is responsible for accounts as well as finance. The London County Council's 'Comptroller' presides over the largest department of this type. Again, as sanitary authority every town council must appoint a Medical Officer of Health, a Surveyor, and an Inspector of Nuisances. Every council which is a police authority must appoint a Chief Constable. The council of a large county borough may employ any of the following chief officers, each with a department of his own: the Clerk; the Treasurer; the Solicitor; the Chief Constable; the Medical Officer of Health (who is usually also School Medical Officer, though this is largely a distinct post); the Inspector of Nuisances; the Surveyor; the Engineer; the Architect; the Water Engineer; the Education Officer (various titles); the Asylums Clerk; and officers of some standing responsible for, e. g., fire brigade, stores, or parks. There may also be officers in charge of 'trading' departments, e. g. a Tramways Manager; a Gas Engineer; an Electrical Engineer; a Housing Manager; and important consulting officers, e. g. an Analyst and a Chemist. Further there will be heads of institutions—the Medical Superintendent of the Asylum; the Chief Librarian of the Free Libraries; the Director or Curator of the Art Gallery or Museum; and so on. On the legal side there will be the Recorder (appointed by the Crown but paid by the borough); the Coroner; the Clerk of the Peace (usually the Town Clerk); and the Clerk to the Justices. The multifarious and somewhat miscellaneous duties of inspection, which devolve on the council—inspection of weights and measures, of theatres and music-halls, or of hackney carriages; inspection under the Explosives Acts, the Shop Acts, or the Employment of Children Act—are variously dealt with; most of them being often grouped in one

department, of which the largest example is the London County Council's Department of Public Control. Many councils have a Works Department, to do by direct labour engineering and building work, especially 'jobbing' work. Far the largest was that established in 1893 by the London County Council; it was abolished in 1909, but the decision is still a matter of controversy, and has not been generally imitated elsewhere. The London County Council also established in 1893 a separate Statistical Department, whose work was of high quality; but although such a department is common in great Continental cities, it found no imitators in England, and was closed in 1912. In smaller towns many of the officers above enumerated will not be needed, of course; and many will be professional men in private practice, employed part-time. Only a few posts, it will be seen, are statutory; the rest are at each council's discretion. When we consider the questions of audit and of control by the central government, we shall understand why the practice is so far from uniform. Even as between large towns, which are generally comparable, the scheme of chief and subordinate officers varies remarkably.

How are these trained staffs brought, in practice, under the control of the lay membership of the councils? Both, it must be remembered, may be large bodies; some councils have over 100 members and over 10,000 employees. Does the council fix only the barest outlines of policy, and leave the details to be filled in bureaucratically? Or does it, like Parliament, depute one of its number to be the head of each department and normally trust the details to him, save once a year when his handling of them is discussed? It takes neither course; it settles policy both in outline and in detail far more fully than Parliament does in the corresponding case; yet it has no Ministerial heads of departments, no Cabinet, no Premier. Instead it has committees, on which, as a rule, all parties are represented in proportion to their strength on the council. Each important branch of the council's work is referred to such a committee, which will meet

Committees; work and authority.

weekly, fortnightly, or monthly according to the amount of business, and supervises the action of the staff with great minuteness. Ordinarily no business can come before the full meeting of the council except in the form of a report from a committee which has considered the subject. How far any committee is obliged to report to the council, and how far it can act in the council's name without thus seeking its approval, are matters which the council itself settles in fixing the committee's order of reference. Great autonomy has sometimes been conceded to committees. Thus the Nottingham (county borough) Council transferred to its Public Health Committee, by a local Act of Parliament, practically the whole of its duties as local sanitary authority under the Public Health Acts; indeed, it may be considered to have constituted the committee the sanitary authority. Again, the Asylums Committee of any asylum authority has a peculiar statutory independence. In London the Asylums Committee of the county council has authority from year to year over all matters within its reference which involve maintenance expenditure only; its decisions require the confirmation of the parent body solely where capital expenditure is involved. But the common tendency is otherwise. Councils usually compel their committees to submit all but trifling decisions to them for confirmation, so that they may, if desired, be fully and publicly debated. But when so submitted, the recommendations of committees are in the vast majority of cases confirmed.

Committees and party system.

The work of the committees is nearly always distinguished by two features: the membership includes representatives of all parties, and the meetings are held in private. The great advantage is that questions are considered on their merits, without much party distraction; the disadvantage is that uniformity and continuity of policy, or, indeed, any hold of intelligible principles, sometimes almost disappear, save so far as they may be preserved by a good chairman or strong chief officers. On the London County Council, where parties are much

more sharply divided than is usual in English municipal politics, the chairmen of all (or all the important) committees are appointed from the dominant party, and their position approximates to that of Ministers, who collectively form a kind of Cabinet, and whose decisions are supported by Whips. This, to some extent, diminishes both the merits and the drawbacks of the system as ordinarily worked; but even so it leaves to the ordinary member of a committee great scope for activity and influence. The complaint of the 'private member' of Parliament, that he has no influence and nothing to do but obey orders, does not arise under the municipal committee system.

The number of these committees varies, like that of the chief officers, according to the scale of the council's work. A few are statutory. Such are the Finance Committee, for all councils; the Watch Committee, for all which are police authorities; the Education Committee, for all which are education authorities; the Asylums Committee, for all which are asylums authorities. The Education Committee is remarkable in that, by statute, it must include co-opted members who are not members of the council. Its work is so heavy, and its expenditure ordinarily forms so considerable a part of a council's whole outlay, that its sub-committees have almost the importance of committees. For the rest, the mapping-out of committees varies much even as between boroughs of similar size. It is usual to have at the apex a General Purposes Committee, on which the chairmen of all the other committees have places, with or without additional members. An important variation in practice relates to the hour of committee meetings. An increasing number of the smaller councils hold them in the evening, which enables professional and working men to attend them without detriment to their private occupations. But the larger councils have found it impracticable to follow suit, and the tendency of their ever-growing work is to make such demands on the time of their active members as are incompatible with the earning of a living. Whether in face of this tendency the councils

Number
and func-
tions of
commit-
tees.

can continue to consist wholly of unpaid members, is an interesting question. It is certain that many councillors are harder worked than many members of Parliament.

Finance
Rates.

The last point mentioned at the head of this section may be briefly dealt with, but is of great importance. An English municipality, unlike all Continental municipalities, has only a single tax, which it can impose, increase, or diminish at its own will. And that tax, a heavy rate in the pound on the annual value of all land and buildings in the area (levied on the occupiers), has no sort of continental counterpart. Descended directly from the Elizabethan Poor Rate of 1601, modified and developed by piecemeal evolution but never planned out, reported upon most elaborately by Parliamentary Commissions and Departmental Committees but never fundamentally overhauled by legislation, it is beyond question the most unpopular tax in the country. It used to be justified as a kind of rough income-tax; but now that under modern conditions no even rough proportion can be traced between the amount of a man's income and the value of the premises which he occupies, it has no apparent equity and obviously oppresses certain classes, especially shopkeepers. The Education Act, 1902, entailing enormous additions to the expenditure which municipalities are compelled to meet from this source, gave the last turn to the screw. Two points must be noted about the resulting 'education rate': (1) it is extraordinarily varied as between towns which have a large population of working-class children and towns which have not (e.g. in 1912 it was 2s. 8d. in West Ham, 2s. 2d. in Hull, 7½d. in Eastbourne, and 9¼d. in Bournemouth); (2) it definitely makes the working-class population unremunerative to the municipality (i.e. the average yield to the rates from a workman's house is less than the average cost of educating his children), and not a few authorities have adopted a definite policy, by building by-laws and otherwise so far as they can, of keeping workpeople out of their areas. Apart from local variations and viewing the rate throughout

the country, one may say that the high figures at which it nearly everywhere stands have brought municipal progress almost to a standstill. The electors irrespective of party will not have it, unless it can be financed in some other way. Hence has come a marked slowing-down of English municipal effort in the twentieth century, contrasting with its forward activity at the end of the nineteenth, and also with the contemporary progress of German towns. Few councils dare undertake new work, unless it is either quite inexpensive or in the nature of remunerative trading.

4. *The Control of the Central Government*

English municipalities are much freer than either German or French from the control of the central government. The reformers, who in 1835 gave them their present democratic constitution, stopped there; they were content to have them each responsible to their local electors. This freedom has, however, been since modified for three main purposes—police, public health, and education; in regard to which the municipality has a certain dependence on the Home Office, the Local Government Board, and the Board of Education respectively.

The control of the Home Office and the Board of Education is exercised through grants in aid. Every borough which is a police authority (excepting the anomalous City of London) receives annually from the National Exchequer one-half the cost of the pay and clothing of its police force, subject to an annual certificate from the Home Office that the force is efficient in respect of numbers and discipline. This system is generally agreed to have worked singularly well, as providing a means whereby local autonomy and initiative is reconciled with the levelling up of local services to a national standard. The relations between the councils as local education authorities and the Board of Education are very similar. A variety of grants are made for different kinds of education, and each is subject to the councils' complying with the Board's rules and satisfying its inspectors.

Home
Office and
Board of
Education
control.

Local
Govern-
ment
Board.

The control of the Local Government Board, which administers no grants in aid, is of a more miscellaneous description. It controls urban district councils by auditing their accounts, but it has not this right against borough or county borough councils. In compelling local authorities to maintain a standard of public health, it has as a rule no weapon save the very clumsy one of *mandamus*, i.e. a High Court action. In all cases where a municipality seeks new powers from Parliament, its wishes carry great weight. Its approval is also generally required for the promulgation of local by-laws. In these two last ways it does much to codify and set up a standard of local practice throughout the country; though its powers are always rather restrictive than motive. They are constantly being added to by legislation, and by some recent measures (e.g. Part II of the Housing and Town Planning Act, 1909) the business of legislation itself has been extensively devolved on the Board.

Grants
in aid.

Each of the three central departments thus concerned is presided over by a Cabinet Minister. But there is nothing corresponding to the dictatorial authority of the Minister of the Interior in France or Prussia. On the financial side the principal grants in aid are, as we have seen, administered by the Home Office and Board of Education, and are conditional on efficiency. But these are far from being the only sums flowing from the National Exchequer to the municipalities. At different times different Governments have on different principles started many such streams, some now mere rivulets; and none has yet systematized and reconciled them. An important type is that of 'assigned revenues' favoured by the late Lord Goschen. In this the proceeds of certain national taxes are merely paid over to the local bodies, with no guarantees as to efficiency. The total amount of local expenditure covered by payments from the National Exchequer in 1912 was less than one-third.

Audit.

Nothing illustrates better the autonomy of the English boroughs than their exemption from any kind of government audit. Their constitution expressly provides for the

appointment of their own auditors. Of these there must be three every year, one nominated by the Mayor and two elected by the borough voters. These 'elective' auditors are not very adequate for workaday purposes; and it is the practice of many town councils to employ in addition professional auditors to conduct a continuous audit of their accounts.

5. *Extensions of Municipal Activity*

The duties cast on a typical town council are extremely important; they include, as we have seen, the police, the education, the sanitation, the paving and lighting, the building regulation, the fire protection, and the control of a great variety of inspecting services. These duties may be added to in one of two main ways: (1) by the council's acting under one of the permissive clauses of the public general Acts of Parliament (e.g. the Public Health Act, 1875, permits sanitary authorities to do a host of things which very few ever do), or by its adopting one of the so-called 'adoptive' Acts (e.g. free libraries, baths, and washhouses are provided under the powers conferred by such Acts); (2) by promoting in Parliament a private Bill. Every council is subject to the doctrine of modern English law regarding corporations, whereby they can only legally do what the legislature has empowered them to do. If, therefore, a council desires to do anything, e.g. construct a tramway, which it is not empowered to do either under a general Act or an adoptive Act, it must obtain a private Act. This is done usually in one of two ways, either by promoting a Bill under the conditions laid down by the Borough Funds Acts, 1872 and 1903, or by obtaining from the Local Government Board a Provisional Order, which in due course may be confirmed by Parliament. The latter method is only available in certain classified cases; its sole advantage is that it costs less. In both cases any opposed measure comes eventually before committees of the two Houses of Parliament, which report to those Houses; and it may be rejected or modified either in the committee stage or on

Duties
of town
councils.

report. In the vast majority of instances the Houses abide by the decisions of their committees, which sit as quasi-judicial bodies, hearing counsel and witnesses. The powers wielded by these committees are of obvious importance, for it is they which have the moulding of all extensions of municipal activity. It is characteristic of the English system that such powers should rest not with officials but with tribunals of non-official elected persons. The advantage is democracy; the drawback is that these Parliamentary committees show some of the capriciousness of amateurs, and while trying to observe a certain formal consistency between their decisions often miss the inner consistency of a strong and definite statesmanship, such as only continuous experience can develop.

**Municipal
trading.**

Among the most noteworthy powers which the English municipalities have thus obtained are powers to run different trading enterprises. These are usually what economists term 'natural monopolies'. A series of special Acts encouraged the town councils to take over water-supply. Nearly every county borough, and not a few boroughs and urban districts, have also now a municipal electric tram service. Some municipalities supply gas; some electric power and light. Municipal markets are common; municipal piers or harbours not uncommon. Other municipal enterprises include the carriage of goods, the running of motor omnibuses, and the manufacture and supply of disinfectants. Others are carried on under general or 'adoptive' Acts; e. g. the building and management of workmen's dwellings, or the provision of baths and washhouses.

**Finance
of trading
enter-
prises.**

The profit-and-loss result of these enterprises is very difficult to ascertain, owing to the absence of any uniform system of municipal account-keeping. Some councils, for instance, will do as the Salford Council did in 1908-10 in respect of its tramway enterprise—treat as profit sums which ought to have been put to depreciation account, and pay them over to the borough fund to relieve present ratepayers at the expense of future. Others, like the London County Council in respect of its tramway enter-

prise since 1907, may after making liberal payments on account of sinking fund and depreciation place the rest of their surplus to a 'general reserve fund', which is an endowment for future ratepayers at the expense of present. The former will figure as profit-making, though they really may be making a loss; the latter as non-profit-making, though they may really be making a profit. With these reservations it may be noted that the amounts drawn from municipal trading in relief of the rates, especially by the northern towns, are very considerable. In 1912 Manchester thus drew £188,500 (including £100,000 from tramways and £50,000 from gas); Liverpool drew £167,399; Leeds, £115,235; Nottingham, £85,713; Leicester, £62,807. This meant a reduction of the rate by 10 $\frac{3}{4}$ d. in Manchester, 1s. 3 $\frac{3}{4}$ d. in Leicester, and 1s. 6 $\frac{1}{2}$ d. in Nottingham. Generally the reduction of rate in this manner was most conspicuous in towns of only moderate size, e.g. in Dewsbury, 1s. 8 $\frac{1}{2}$ d.; in Macclesfield and in Darlington, 1s. 6d.; in Halifax, 1s. 5 $\frac{1}{4}$ d.; and in Stockport, 1s. 5d. These figures sufficiently explain why municipal trading has grown and is growing, and why it prevails most in districts where the business spirit is keenest. It is also pushed by the Labour interests, as the conditions of municipal employment are superior to those of private. Practically every municipality employs workmen belonging to organized trades on trade-union terms, and also pays its unorganized labourers a minimum wage decidedly higher than any but the most generous employers in its district would pay.

It may be noted at this point that the standard of purity in English municipal life is a high one. Serious scandals have been known, but they are rare; generally speaking the committee system involves too much publicity and too many active critics for them to develop. In the large towns a remarkable sum of ability and industry is given to the public service on the councils without any reward for those who give it excepting public esteem. Nor are the councils extravagant. Under the present pressure from ratepayers the charge is rather the

other way; they do not really spend enough, especially on their public buildings and on the beauty and amenity of their towns.

Borrow-
ing of
capital.

It may be added that the very large capital sums required for municipal enterprise are borrowed mainly in one of three alternative ways (developed under a series of Acts beginning with the Public Health Act, 1875, and the Municipal Corporations Act, 1882), each of which requires the approval of the Local Government Board to be obtained. This is one of the more important kinds of control exercised by the Board over larger municipalities.

6. *Other Local Authorities in Towns*

When in the nineteenth century the legislature began grappling with urban problems, its first inclination was towards appointing an *ad hoc* authority for each problem. Later it pursued the policy of consolidating all local public work in the hands of the elected municipality. But there still remain some of these separate local authorities, either as survivals from the past, or as new creations by the legislature, which in approaching new problems during recent years has reverted, perhaps without very full consideration, to the *ad hoc* method so often discredited.

Poor Law. The principal old survivals are the Boards of Guardians, as constituted by the Poor Law Amendment Act 1834, which administer relief to the destitute. Poor Law policy is identical for town and country, and the boundaries of Poor Law Unions, though not unchangeable, have no necessary relation to those of municipalities. Each Union has a Board of Guardians elected by the widest of the English local government franchises. Women are eligible for it, and a fair number have been elected. Each Board chooses a chairman and appoints a paid clerk; a paid staff, often very large, is employed under the latter. The Board usually acts on the advice of committees somewhat as a municipality does. It enjoys relatively little autonomy, being closely controlled at all main points by the Local Government Board.

These Boards excite little public interest and have no high reputation. In 1905 a Royal Commission was appointed to consider the Poor Law. In 1909 it reported, and its Majority and Minority Reports, differing in most respects, agreed in demanding the abolition of the Boards of Guardians. The verdict of the public is shown by its apathy at elections. For instance, at the elections for Guardians in London in 1913, 44·8 per cent. of the Guardianships were uncontested and 78·7 per cent. of the electors did not take the trouble to vote.

Among the newer creations, those not restricted to particular cases and localities are the Distress Committees and Central Unemployment Bodies under the Unemployed Workmen Act, 1905, and the local Insurance Committees under the National Insurance Act, 1911. The former are purely urban; they are confined to the metropolis and to such boroughs or urban districts as have over 50,000 population; they consist of representatives of the municipality, representatives of the Boards of Guardians, persons experienced in the relief of distress, and nominees of the Local Government Board. The latter cover the whole country; there is one local Insurance Committee for each county and county borough. It consists of representatives of the different classes of insured persons, of the medical profession, of the Government, and of the county or county borough council—the last contributing only about one-fifth. Neither of these sets of local bodies, it will be seen, is popularly elected; yet in both cases what Parliament has set up are independent authorities, subject only to the organs of central government—in the one case to the Local Government Board, in the other to the National Insurance Commissioners.

7. *Some General Features of English Town Life*

English towns as compared with continental are ugly but fairly healthy. Unrestrained for four centuries by military fortifications, they have always grown laterally rather than vertically. The houses are low; flat-life, except in London, is rare and unpopular; the typical

Distress,
unemploy-
ment,
insurance.

Appear-
ance.

English town workman lives in a two-floored, self-contained cottage. Till the comparatively recent introduction of elaborate building by-laws, these were built in narrow streets. It was not till 1909 that an Act was passed enabling municipalities to undertake the further task of town-planning their areas. Four years later comparatively little had been done under it.

The external effect of this low and little-regulated building is sordid. Foreigners visiting English towns are struck by the interminable areas of mean houses, the narrowness of the streets, the startling absence of trees. Tree-planted boulevards, such as nearly every fair-sized German or French town boasts, are scarcely to be found in England. In the manufacturing towns the smoke nuisance is carried to a pitch quite unknown elsewhere in Europe. Even in residential districts it is relatively bad, owing to the peculiar English preference for open coal fires over closed stoves.

Health.

The following tables show for comparison the death-rates for 1911 of typical English towns and certain foreign ones :

DEATH RATES, 1911

A. Metropolitan Areas with over a Million Population.

London (the County)	15.0	Chicago	14.6
Certain Metropolitan suburbs—		New York	15.1
Hornsey	9.5	Berlin	15.6
Walthamstow	11.6	Vienna	16.4
Croydon	11.8	Paris	
Willesden	11.8	St. Petersburg	20.8
East Ham	12.1	Moscow	27.2

B. Great Towns.

Leicester	13.3	Rotterdam	12.1
Bradford (Yorks.)	14.9	Amsterdam	12.4
Bristol	15.1	Stockholm	12.7
Newcastle	16.1	Christiania	13.5
Leeds	16.4	Brussels	13.9
Hull	16.7	Dresden	14.6
Birmingham	16.8	Hamburg	14.7
Manchester	17.0	Copenhagen	14.8
Liverpool	20.0	Munich	15.8
		Rome	16.2
		Milan	20.1

From these figures it will be seen that the English towns in respect of their death-rate range somewhere

between those of the Germanic countries on the one hand and those of the Latin countries on the other. Most of the former have a climate so far similar to the English that one is almost compelled to attribute the superiority of Amsterdam, Rotterdam, Antwerp, Hamburg, and Copenhagen over their English equivalents to superior administration. What is perhaps more surprising is that the towns of the United States, whose municipal government has been so much criticized, show well by this test.

Many traditional ideas about English habits need to be Games. revised as regards the population of modern English towns. Games, for instance, and athletics play no part in the lives of perhaps 90 per cent., except as spectators. Cricket and football have for town purposes been largely transformed into shows on a commercial basis; the few famous teams, mainly composed of professionals and each run by a club with a show-ground in one or more of the big towns, attract thousands of paying spectators, who watch and make bets much as at a racecourse and would no more dream of playing themselves than of becoming jockeys. While it thus pays well to run playing-fields for show-games, it never pays permanently to run them for any but rich people to play on themselves. Genuine clubs of amateurs find some temporary accommodation on building land still unripe for development or, at the cost of the municipality, in the public parks. But the number thus catered for is small, and the clubs are mostly subsidized by churches, chapels, politicians, or philanthropists. The English town youth, as a class, cares so little for games that he will not pay to make them self-supporting. He prefers to spend his money on watching professionals and on indoor entertainments.

Physical culture in the elementary schools has been Physical culture. much developed since 1902, but its failure to impress itself is shown by the very small numbers who attend any continuation classes of this kind. There is nothing equivalent to the cult of gymnastics so widespread in central Europe. The association, however, of school swimming lessons with municipal swimming-baths has

made athletic swimming, at the ratepayers' expense, genuinely popular in some towns, especially in the North. More widespread is the work of 'boys' clubs', now a well-recognized branch of voluntary philanthropy, and of the 'boy scout' movement, which has outpaced and swallowed up the earlier 'lads' brigade' movements. Parallel to these last are 'girls' clubs' and corps of 'girl guides'.

Education.

Education has since 1902 made great strides, especially in the direction of a better mapping out and linking up of elementary, technical, secondary, and university education. The Report of the Board of Education, 1911-12, shows that, whereas in 1900 only some 5,500 children from English elementary schools were holding scholarships from local authorities, in 1911-12 the total number holding such scholarships or free places at approved secondary schools was 52,583 (27,572 boys and 25,011 girls). Much progress was made during the same period in the development of teachers' training colleges, the substitution of trained for untrained teachers, the increased supply of secondary schools, and the diminution of the excessive size of elementary school classes. The Labour Exchanges Act, 1909, under which, among others, juvenile labour exchanges were established, has led to an elaborate machinery being developed for placing ex-school-children in suitable occupations. Lastly the Education (Administrative Provisions) Act, 1907, which compelled local education authorities to have their children medically inspected and empowered them to supplement inspection by treatment, has started a system of physical 'children's care', to the development of which great public attention has been drawn. With this last may be connected the public feeding of necessitous school-children under the Education (Provision of Meals) Act, 1906. The new semi-municipal development of universities in the great modern towns—Birmingham, Manchester, Liverpool, Leeds, Cardiff, Bristol, Newcastle, Nottingham, Reading, &c.—also dates largely from the twentieth century.¹

¹ [On education, see further chapter vi in the General volume (VI) in this series.]

Indoor entertainments in English towns were never so much patronized as since 1900. About that date began a great development of the music-hall, connected with the concentration of music-hall management in a few great central syndicates, who effected enormous economies by a pooling system. Under these auspices music-halls grew apace in the suburbs of large cities and in relatively small towns, as well as in the great centres. A few years later that still cheaper and still more localized institution, the cinematograph hall, came into its enormous popularity. Beside music-halls and 'cinemas' the regular theatre barely holds its own; it does not increase its vogue. Concerts and lectures, menageries and circuses, have lost ground; and fashions like roller-skating prove transitory. There are no publicly endowed theatres or opera-houses in the English towns, and opera scarcely exists. It is occasionally given by travelling companies, but otherwise is merely a fashionable exotic, performed mainly in foreign languages for short seasons at one or other of two high-priced London theatres. With rare exceptions, due to conscious local artistic effort, all the plays acted outside London are acted by travelling companies, who merely hawk round the provinces the various London successes.

Perhaps the most striking thing in English town life, as compared with what preceded it, is its impersonal note. In the towns people mix increasingly little with their next-door neighbours. Few men's personal records are widely known; still less the record or standing of their families. Responsibility is thus diminished, though the sense of equality is increased. Between working under orders and watching a provided entertainment, most people's days can be passed with little initiative outside the home. The home itself is much weakened; and among the working classes the day and evening schools of the children, the working-man's club of the father, and the penny 'cinema', which all attend down to the baby in arms, leave little time for domesticity. Whether the hold of religion slackens may be debated;

Indoor
entertain-
ments.

Social
habits.

but its exercise has certainly become far less a domestic and far more exclusively an institutional matter.

At the same time drunkenness has steadily diminished, not least during the twentieth century; the percentages of illiteracy and of crime have both fallen very low; the percentages of pauperism are lower than at any time during the nineteenth century. It has been much argued whether latterly the rise of wages has kept pace with the rise of prices; but there can be little doubt that in nearly every social class the current standards of food and clothing are decidedly higher than they were within the recollection of the older people. Among the luxuries, which have enormously increased, not the least important is travelling. Town workpeople spend a relatively very high proportion of their savings on trips and excursions. They are also increasingly mobile in regard to residence; and the old distribution of the English and Welsh people into many more or less segregated types, each settled in its special district and talking its special dialect, has steadily diminished in proportion as town life has developed. From the great amalgamation of types which goes on in centres like London and Manchester, new types, still indistinct, seem to be emerging.

PECULIARITIES OF SCOTTISH TOWNS

Scotland
as an in-
dependent
part of
Great
Britain.

Scotland at the 1911 census contained about one-ninth of the population of Great Britain, one-tenth of the United Kingdom. Over a third of its inhabitants were living in the seven Scottish towns which exceeded the 50,000 limit. Besides these, a large number of Scottish people live under some sort of urban government in some seventy other 'royal' or 'parliamentary' burghs, as well as in the important 'police' burghs. There are proportionately more little town administrations in Scotland than in England, because, as on the Continent, peace and civil order were established later and the security of a walled town was valued longer.

Though Scotland and England have been united politically for over two centuries, each has its own separate

system of law, separate central government departments and judiciary, and separate local government. The separateness of the last is in appearance complete. Hardly any statutes affecting English local government affect Scottish, and those only with modifications. Parliament scarcely enacts the simplest principle without a separate statute for each country. For instance, in 1908, when it wished to abolish the disqualification of women for sitting on town councils, it must needs pass two short Acts—one for England and Wales, the other for Scotland.

But the dualism is more apparent than real. For three centuries the administration of the two kingdoms has grown towards a common pattern, and since 1832 reforms adopted in the one have usually been adopted in the other. In local government many differences of nomenclature remain, but few of substance, except the survival in Scotland of *ad hoc* School Boards. The Scottish town dweller is subject, as a rule, to three local authorities: the town council, the parish council, and the school board. We will briefly consider them in this order.

Town councils are now regulated by the Town Councils (Scotland) Act, 1900, under which the differences between the various types of Scottish burghs are practically effaced. Types of burghs.
Of these types there are mainly four:

1. A Royal Burgh, like the old English boroughs, is a corporate body set up by a charter from the Crown. The anomalies of these burghs were reformed by statute in 1833, two years before Parliament reformed those of the English boroughs.

2. A Parliamentary Burgh is one which, following the redistribution of Parliamentary seats in 1832, had by an Act of 1833 a magistracy and council like that of a royal burgh given to it, whereas it had none before.

3. A few 'Burghs of Barony' or of 'Regality' are historically interesting relics of feudalism, but have now been assimilated to the rest, and have the whole of the provisions of the Town Councils (Scotland) Act, 1900, applied to them.

4. The name 'Police Burgh' is popularly given to a

town which has been formed into a burgh under one of the Police (Scotland) Acts [1862, 1892, and 1893]. Under these Acts seven householders of any place with over 700 inhabitants may petition the sheriff, who must then take prescribed steps (including, if seven voters demand it, a poll) to ascertain the wishes of the public; if these are found to be in favour of a burgh constitution, he proceeds to declare the place a burgh and to fix its boundaries, subject to certain rights of appeal to the Court of Session. This remarkably free and democratic procedure, whereby, practically, the inhabitants of any fairly populous place can have it made a burgh if they please, has no parallel in England. It was much used in the nineteenth century by towns of modern growth. The constitution of such councils is now, like those of other burghs, fixed by the Town Councils Act, 1900.

Town
councils.

A Scottish town council consists of a provost, bailies, and councillors. The provost and bailies correspond to the English mayor and aldermen, and are elected similarly. They differ in that their functions include those exercised in England by a commission of the peace. They are, indeed, collectively known as the magistracy. The number of bailies in a given town, as of councillors, is fixed now by statute on a rough population basis. The councillors are elected for three years, one-third annually. The electorate includes all who are on the parliamentary register and all who would have been but for (1) being peers, or (2) being women (including married women), or (3) having removed from one part of the municipal area to another, or (4) residing over seven miles from the municipal boundary. A woman, married or single, may be either councillor, bailie, or provost; but if provost or bailie, does not sit as a magistrate, an extra bailie being appointed to do her magisterial work. The main features of English municipal administration are all reproduced by the Scottish town councils, which consist of unpaid amateurs, work through committees, employ paid officers, are financed by a local rate, and are confined within the circle of powers conferred by Parliament in the same

way. A few, and notably the great municipality of Glasgow, have taken a leading part in the shaping of British municipal progress.

Next in importance in the Scottish towns is the parish council. In England the parish council is only a living ^{Parish councils.} body in rural districts. In Scotland parish councils are divided into 'landward' (rural) and 'burghal' (urban), while some are partly landward and partly burghal. In burghal parishes the election procedure and the electorate are the same as for municipal elections. The council, which consists of not less than three nor more than thirty-one members, is elected triennially, all retiring together. Women, married or single, are eligible. A statutory meeting is held annually in December, when a chairman is elected and committees appointed. The accounts are audited by auditors of the Scottish Local Government Board.

The most important thing for which the parish council is responsible is the administration of the Poor Law. It does the work of the English Boards of Guardians, its powers being conferred by the Poor Law (Scotland) Acts, 1845-1898, and the Local Government (Scotland) Act, 1894. Its officers include a Clerk, an Inspector of Poor, a Collector of Poor-Rates, and a Medical Officer. The only one calling for comment is the Inspector of Poor, who is the council's chief executive officer. He enjoys a degree of independent authority which no other executive officer does in the scheme of British local government. The council appoint him but cannot dismiss him; he holds office *ad vitam aut culpam*, the judge of *culpa* being the Scottish Local Government Board.

Other duties of the parish council include the administration of parochial trusts, assessment and rating, the administration of the Vaccination Acts, and of the provisions of the Children Act, 1908. In some burghs the parish council is also the burial authority and the authority for registering births, deaths, and marriages.

The school board in its present form dates from 1872, ^{School boards.} but a parochial education authority had existed in Scot-

land since 1696. In burghs the Act of 1872 made the school board area the same as that of the burgh. The boards are elected triennially; any person who is not a teacher in a public or state-aided school, nor a paid officer under the school board, is eligible; the franchise is the same as for town and parish councils, but there is the rough attempt at proportional representation known as the 'cumulative vote', every elector having as many votes as there are seats for his area, but being allowed to concentrate them if he likes on single candidates. The school board not only is the local authority for elementary education, but since 1908 it has a free hand (disputed before) to spend what it likes out of the rates, as well as the proceeds of various grants, on secondary education. The Act of 1908 also makes it its duty to provide continuation classes for those over fourteen.

The interesting point about these school boards is that they represent a principle discarded in England, viz. that of entrusting education to a local authority elected *ad hoc*, and not to one elected for general purposes. The English school boards, started on this principle in 1870, were abolished in 1902, but there was little or no talk of abolishing the Scottish. The reasons seem to be mainly historical, the Scottish educational system being in its essentials extremely ancient and deeply rooted in the life of the people.

Scottish
national
adminis-
tration.

The departments of the central government controlling local administration in Scotland correspond closely to the English, but have their offices in Edinburgh, and have as their Parliamentary head the Secretary for Scotland. There is a Scottish Local Government Board, which, like the English, combines the central authority for the Poor Law with that for public health, housing, and municipal affairs generally. There is a Scottish Education Department, with offices in London and Edinburgh, which controls the local authorities through grants just as the English Board of Education does (pp. 338, 345, &c.).

Social
town life.

The general character of Scottish town life is closely assimilated to English. Especially is this the case with

recreation. Workmen in the two countries frequent similar variety theatres with the same artistes, similar cinematograph halls with the same films, similar football matches, often with the same professional players. They drink more spirits and less beer, and there is more drunkenness. On Sunday the difference of religion entails some national divergences, but in the towns they are inconspicuous. The most striking external difference is in respect of housing. The Scottish workman has not the Englishman's craving for house-room, nor his insistence on a separate house with its own door to the street. Instead, therefore, of the expanse of low buildings which is typical of English towns, the larger Scottish cities consist almost entirely of high buildings; the workmen, and indeed nearly all classes, living in flats, much as in Germany. The rents are high—the highest in Britain outside London; and a Blue Book of 1913 upon the cost of living showed that, largely but not wholly for this reason, the Scottish towns are, excepting London, decidedly the dearest in Britain for a workman to live in. The census of 1911 showed that Glasgow housed 60·1 per cent. of its population in tenements of one and two rooms; Edinburgh, 35·2 per cent.; London, 20·8 per cent.; Liverpool, 7·3 per cent.; Manchester, 2·9 per cent.; Birmingham, 1·7 per cent.

[On local government generally see E. Cannan, *The History of Local Rates* Works of in England, London, 1912; D. O. Dykes, *Scottish Local Government*, Edin- reference burgh, 1907; Sir G. L. Gomme, *Lectures on the Principles of Local Government*, on local London, 1897; W. Blake Odgers, *Local Government*, London, 1907; J. Red- govern- lich and F. W. Hirst, *Local Government in England*, London, 1903; Sidney ment. and Beatrice Webb, *English Local Government from the Revolution to the Municipal Corporations Act*, London, 1906 seqq.; Sir R. S. Wright and H. Hobhouse, *An Outline of Local Government and Local Taxation*, London, 1906.]

· CHAPTER XV

THE ENGLISH VILLAGE

BY HAROLD J. E. PEAKE

Types of
villages.

THOUGH the English are essentially an industrial nation, neither the history of their country nor its present condition can be fully appreciated without an adequate knowledge of the English village. The village, far more than the town, is characteristic of our national life, and from it have gone forth the great majority of those who have made the empire. Description, however, is by no means simple, for though all villages have much in common and the vast majority have developed from settlements with similar characteristics, yet many types, differing in no small degree from one another, may be recognized in the twentieth century.

Suburbs.

The suburban village is in a great measure the product of the last half-century, and in this type may be included, not only those villages within thirty miles of the metropolis and our large industrial centres, but many of those lying within two miles of our county and larger market towns. It is characteristic of such villages that a large proportion of their inhabitants find employment at a distance, and are in consequence more interested in the public affairs of the neighbouring town ; there is also, as a rule, more money available for the support of local institutions, though these often lack the spontaneity often found in the true villages, and have in consequence a somewhat artificial aspect.

Industrial
villages.

The industrial village is the product of recent times, and bears many of the characters of the urban area, into which it not uncommonly develops both in name and government as well as form. Even when such villages have been converted into urban districts, they frequently retain some survivals of their former status. The villages

that have grown up around coal mines and quarries may be placed in this category, though the latter seldom throw off entirely their rural character. Fishing villages are in some respects different again, though many of these have grown into seaports or seaside resorts.

A less common type is the decayed market-town, or ^{Market} the village which, even without a weekly market, has ^{villages.} in former times become the centre of local trade. Though but little larger or more important than their neighbours, these villages have a quasi-urban appearance, and this is the more remarkable since in many cases their status has been in no way superior to that of their neighbours since the Norman Conquest.

But the chief type of the English village, that from ^{Agricultural} which nearly all have sprung, is the agricultural village, ^{villages.} and it is this type that will be described in the following pages. Even many of our towns show signs of their village origin, and most if not all of them at one time possessed their common fields. So the agricultural village may be taken as the type from which all our English communities have sprung.

Even among agricultural villages many varieties may ^{Type of} be found. Some have arisen upon highways, and these ^{agricultural} will be found straggling by the roadside for a mile or ^{village.} more, while part of their population caters for the needs of the traveller. Even when the road has ceased to be a highway the form is preserved, and inns are exceptionally numerous. A special type of such village is generally found at the meeting-place of two highways, and here traders on both routes were wont to exchange commodities. Such villages have usually, though not invariably, developed into towns, as has always been the case with those situated at fords or bridges.

A further type, most common in the midlands, is the hill village, usually a settlement in a forest clearing. There is another type of forest village which is found, especially in the south of England, which consists of a number of scattered hamlets—a farm-house and a few cottages—distributed over an area formerly thickly

wooded in the spots where open glades made clearing easy. Many such hamlets are often united for the purpose of civil and ecclesiastical administration, and it is usual to find that the roads connecting them meet at one point, forming a star. Such a point has been aptly termed the Hunter's Tryst, and here is the village public-house, and often the church and school, though seldom a farm or cottage.

Such are some of the more prominent types of the agricultural village, but innumerable variants are to be found, due no doubt to primitive geographical conditions and the form of primeval vegetation. Others show characteristics of more than one type unevenly blended.

There is still another type, which is the prevailing one in the south of England, and is by no means unusual in other parts of the country, the valley village, which, from its constant occurrence in one of the kingdoms of the Saxon Heptarchy, may fitly be termed the Wessex type. This seems to be the central type from which others are variants, and around this type grew up that body of custom which after the union of the Saxon kingdoms became imposed with a certain amount of elasticity upon the remainder. This then is the one that will be taken to stand for all, though the reader should remember that in so far as a village varies from this type, so will its other characteristics tend to be different.

The valley
or Wessex
type of
village.

The essence of the Wessex village was that it was placed near a good supply of water, either that of a river or of a line of springs, and its chief asset was a length of alluvium in the valley bottom to be used as water-meadow. In the original settlement of the country—whether by the Saxons or by some of their many predecessors is at present uncertain—the great aim seems to have been to apportion the alluvium as evenly as possible among the various groups of settlers. Where the alluvium was wide, settlements arose on either side and the river formed the boundary, but in smaller valleys the whole width of the alluvium was allotted to one community, and the lands belonging to it stretched up the slope on

either side. The huts of the settlers, with the buildings for their cattle and the storehouses for their grain, were erected on the hard ground beside the meadow, if possible on a rising knoll, but within easy reach of water. On the slopes beyond were the arable fields, stretching as time went on, higher and higher up the sides of the valley till dense woodland or unprofitable soil made further extension impossible. Beyond this again was the waste, containing woodland, whence building material and fuel could be obtained and where pigs could run, or open heath or grassland, which provided pasturage for the cattle. This extended to the top of the hill, where it marched with the waste of the adjoining village.

An interesting parallel to this type of settlement may be seen in the formation of ranches in the upland valleys of British Columbia. Owing to the lack of rainfall in the dry belt to the east of the coast range, water-meadow capable of irrigation is a necessity. The prospective rancher first selects his portion of the valley bottom and secures the needful rights to water, then builds his log-hut on the rising ground by a spring or near a creek. The further extension of his ranch follows the lines that have been indicated as having taken place in England, though owing to the distance between the rivers his waste seldom reaches within many miles of the next valley. He is free to extend his ranch as far as the capital at his disposal and the proximity of his neighbours permit, and the waste beyond his control is government land, common to all, and on this his cattle range during the summer months.

Such was the primitive English village of the Wessex type, and many existed a century ago. The other types approximated to this model as nearly as geographical circumstances permitted. Such an area was known as a township, or the land belonging to a *tun* or village, and in Wessex at least it became known usually, if not invariably, in later days as a tithing. It formed also the basis of the manor, with which it was often co-extensive, as well as of the parish.

The parish, the unit of ecclesiastical authority, has been also for many years the unit of civil administration ; it has in most cases so far supplanted the township that the latter has lost its identity, and its bounds cannot always be recovered with certainty. The parish was originally merely the area which paid tithes to a particular church, and certain forest areas, wholly uncultivated, were considered as extra-parochial.

The origin of the parish is uncertain ; it is commonly stated that Theodore, Archbishop of Canterbury, 669 to 690, divided the whole country into parishes, but this statement must be accepted with caution. It does not seem reasonable to doubt that Theodore introduced into this country the idea that the country should be parcelled out into areas, in each of which there should be a parish priest, but it is highly improbable that he succeeded in bringing the scheme to completion, while it can be shown that many parishes changed their boundaries even after the Norman Conquest.

That in many cases the parish and the township were conterminous is certain, and in many more it seems highly probable. Nevertheless, there are many cases where a large parish consists of two or more townships, while in the west midlands the number of such townships is often great. In other areas the reverse is the case, and the township has been divided into two or more parishes, usually with the same name, but distinguished as great or little, east or west, or by such suffixes as Monachorum, Regis, or the name of some manorial lord. In the years immediately following the Conquest it was the custom of the more powerful abbeys to secure the tithes of townships adjoining their churches, and this practice accounts for many of the larger parishes. It sometimes occurs that a parish consists of several townships and portions of others, as the holders of land could at one time grant their tithes to the church of their choice.

In the Middle Ages the parish was merely the ecclesiastical unit while the townships, grouped into Hundreds, remained for civil purposes. There was a tendency for

the township to become identified in some measure with the manor, which, like the parish, might contain one or more townships or only a part. Often the manor and parish were conterminous, but this was by no means invariably the case.

As the jurisdiction of the manor decayed towards the close of the Middle Ages, it became more usual for the civil administration to be conducted on the parish basis, and eventually the township remained only an agricultural unit and ceased to have any reason for existence with the enclosure of the common fields. The successive enactments relating to the relief of the poor did more than anything else to establish the parish in its civil capacity, while the periodic meetings of the vestry to attend to ecclesiastical affairs provided a convenient assembly for the transaction of secular matters, especially when the manorial courts had ceased to be held.

Until recent years parishes had remained practically unchanged as to area since the twelfth century, and if additional buildings were required for ecclesiastical purposes this need was met by the erection of chapels of ease. In certain cases permanent clergy were appointed to such chapels, and these were known as perpetual curates, while the area over which they discharged their duties was known as a chapelry. Some ancient chapelries, however, had been distinct parishes before their absorption in the larger parish in the eleventh or early twelfth century.

The great increase in the population of England caused by the industrial revolution, which was followed by a revival in the religious life of the country, led to the erection of many new churches and the formation of a number of new ecclesiastical parishes, whose clergy were afterwards granted the title of vicar. Such new ecclesiastical districts did not necessarily become distinct civil parishes, though in some cases they were given civil as well as ecclesiastical autonomy. The old township basis was largely, though not invariably, used for the formation of these new parishes and for the determination of their bounds.

Ecclesiastical parishes.

Popula-
tion.

The population of villages necessarily varies, even in the case of those that are agricultural. There is a tendency for some to increase at the expense of their neighbours; some consist of two townships fused, while others increase from the proximity of railways or cross-roads, or by the multiplication of small holdings. The ordinary agricultural township, the population of which has not been augmented by some such cause, rarely contains a population exceeding 250 persons; often it is very much smaller.

The
squire.

The inhabitants in most truly agricultural villages are very similar. The leading person is the squire or lord of the manor, who still has the prestige of earlier days, though all the powers that he formerly possessed have vanished. If he is the representative of a family long connected with the village, he is still looked up to as its natural leader and the final arbiter in all village difficulties; the position, however, is weakened in the case of new-comers, and varies according to the amount of interest taken by them in local affairs.

In many villages the squire is non-resident, living either in a neighbouring parish or perhaps in a distant county. In these cases it sometimes happens that there is another gentleman of property, perhaps a large freeholder, or the tenant of the old manor-house, who to some extent fulfils the functions of the squire; but, unless he be a cadet of a local family or an adept at county business, he is but the shadow of the genuine squire, and in no case does he hold to the full the position of the lord of the soil. This is especially the case when the squire has leased his place to a stranger.

In addition to the squire, there may be one or two gentlemen of private means, retired officers of the army or navy and the like, occupying houses, often converted from farm-houses no longer needed; these are seldom looked upon as forming part of the community. This class has increased since the advent of motors, when many an old manor-house, long used as a farm, has been converted again into a stately mansion; tenants of this

kind may be found in greater numbers within a mile or two of county and market towns.

After the squire, in importance, comes the parson, whose position is the greater if the squire is non-resident. In the nineteenth century the parson was often the younger brother of the squire or held a family living which passed from father to son, and his position in matters ecclesiastical might be compared with that of the squire in secular affairs; he sometimes even invaded the province of his lay colleague. A considerable change has, however, occurred during the last half century, owing, in part at least, to the fall in the value of tithe-rent-charge. Some parsons of the old school are still left, it is true, and a few men of the old type still take orders, but the vast majority of the younger clergy are of a different stamp both by birth, education, and experience. While they are, perhaps, more efficient and certainly more energetic in the performance of their spiritual duties, they are less looked up to for advice in matters secular; they may be more respected and beloved than their predecessors, but their counsels seem to carry less weight; they are the friends of their parishioners but not the rulers.

Below the squire and the parson are the farmers, a compact body who usually act in concert and without whose goodwill local changes stand little chance of success. As successors of the old members of the court leet and voters at the vestry meetings they expect to be consulted on all local matters of minor importance, and in many parts of the country they form the only articulate public opinion in existence.

In old days the farmer class included all holders of land, however small, except perhaps tenants of an acre or two, but during the nineteenth century, in the days when farming returned high profits, most of the smaller holdings were merged into the larger farms. Since the return of bad times, in the eighties, there has been a tendency to revive the smaller holdings, and the movement has been accelerated by several subsequent Acts of Parliament. As a result a new class of small holders has arisen who

have little in common with their richer neighbours and are often in conflict with them. This class is usually too much engaged in making a precarious living to enter much into public affairs, but signs are not wanting that before long it will become by no means the least important factor in the community.

Tradesmen.

Shopkeepers as a class are not numerous ; most villages possess one shop which supplies a varied assortment of goods, mostly in the nature of food, but it is becoming increasingly common for the villagers to pay a weekly visit to the market town, there to invest their weekly wages in such goods as are offered by the branches of the co-operative societies and such-like stores. The larger villages alone are proof against this competition. Butchers and bakers occur in about half the agricultural villages, and all have at least one public-house.

Craftsmen, &c.

A small though important class are the craftsmen, headed by the village blacksmith and the wheelwright. Estate bricklayers and carpenters are to be found at the centre of large properties, while hedgers and ditchers, woodmen, and sometimes hay-tiers, thatchers, and well-sinkers, live in most villages. In this class may be reckoned the parish clerk, the policeman, and sometimes the stationmaster, and occasionally one or two men, rather more skilled than their neighbours, who pick up a living by undertaking a multitude of odd jobs.

Farm labourers.

Lastly come the farm labourers, the most numerous class of all. Steady and plodding, they have little initiative, and less ambition. The quality of their work is said to be deteriorating, which seems likely, as the younger generation, if possessed of any character or energy, tend to search for employment offering more opportunity of advancement. The casual labourer, dependent on odd jobs, is not often found, and the poorest class in the community consists of the old men, who through age or infirmity are past work, and the widows of the agricultural labourers.

Manorial courts.

The perusal of old manorial documents shows us that during the Middle Ages, and to a less extent during the

succeeding centuries, there was a real sense of corporate unity in the village, and the court rolls are full of evidence of the keen interest taken in the welfare of the community. Agricultural operations, necessitated by the system of common fields, form the majority of the matters considered, but other acts of administration for the good of the village are by no means absent. The enclosure of the common fields, which took place in some parts as early as the sixteenth century, if not earlier, and which was practically completed throughout the country before the middle of the nineteenth century, changed all this. In most places manorial courts ceased to exist, and where they were still held it was only for the receipt of quit-rents due to the lord: where an unenclosed common exists at the present day some semblance of the former interest is taken by the commoners, but this is only the shadow of the earlier state of things.

As the influence of the manorial courts waned, that of the vestry increased. Vestries. The latter was the chief authority for conducting parochial business during the seventeenth century, and its vigour survived during the eighteenth. During the nineteenth century the vestry books show that the interest was declining, and this in spite of the revival of religious life in the middle of the century—perhaps because of it; this revival was, in fact, to a great extent a clerical movement, not always in harmony with village opinion, and there was a tendency to leave everything to the parson, who was willing to bear all the burden if he could have the sole guidance of the policy. The local interest in the proceedings of the vestry continued to diminish, until the abolition of the church rates in 1868 left little for it to do but to appoint churchwardens and overseers, and to attend to the fabric of the church. It had, however, by this time become customary for the parson, and those who thought with him, to consult the vestry as little as possible upon the last point.

The removal of the administration of the poor law to the guardians in 1836, and the creation of highway boards Parish councils. in 1862, though undoubtedly followed by increased

efficiency, helped further to destroy communal feeling, until towards the end of the nineteenth century all corporate idea of village life had wellnigh disappeared. It was to mend these matters, and to revive an interest in local affairs, that parish councils were formed under the Local Government Act of 1894.

In the larger industrial villages, and in others where exceptional conditions prevail, this Act has succeeded, and the councils command the services of the best men of all classes and have much valuable work to show. In the truly agricultural parishes, however, unless they be exceptionally large, the Act has been practically a dead letter. In some villages men of all classes, anxious to improve the conditions of their locality, served on the councils during the first years of their existence. Many, however, were discouraged when they found how limited were the powers at their disposal, while the fear of rising rates caused the farmers to enter the lists, and with the aid of the open votes of their employees they were usually successful in monopolizing the seats. The agricultural village, therefore, remains much the same as it did before the Act was passed.

District
councils.

The district councils, in which one or two representatives from each parish within the rural district act as the rural sanitary authority, have been on the whole more successful. In some areas useful and capable men and women, with a real knowledge of the matters to be dealt with, have come forward to take their part in public work, to the great advantage of the district they serve. But in many of the more thinly populated parts of the country the district council is but a slightly improved parish council, and the main object is to keep the rates as low as the Local Government Board inspector will permit.

County
councils.

On the county councils, however, which were created by the Local Government Act of 1888, we find almost invariably a different stamp of man. This work has secured the services of some of the ablest and best educated of the residents in the country side, and in the majority of the English shires the work accomplished has been thoroughly

and conscientiously performed with extreme fairness and corresponding benefit to the area concerned. Unfortunately all county councillors are not of equal value, and there are only too many whose sole object is to obtain a cheap popularity by opposing expenditure. These, however, usually carry little weight among their colleagues, and the chief work of the council is carried on by the intelligent minority. The result of this state of things is unfortunate. The really effective councillors are overworked, and serve on too many committees to be able to give adequate attention to details ; which are necessarily left in the hands of the paid staff, with the result, natural to all bureaucracies, of an increase in administrative expenditure and of the methods usually associated with 'red tape'. Nevertheless, the county councils may be considered as eminently successful, and they have done more than all the other councils to forward the welfare of the dwellers in our English villages.

A word must be said about the administration of the Poor Laws. The terrible revelations of mismanagement disclosed by the Poor Law Commissioners' Report in 1834 caused the Government to remove the direction of these matters from the parish authorities and to create boards of guardians for all the parishes in the newly-created areas known as unions. These usually consisted of one market town and all the villages that surrounded it, though this was not invariably the case. The formation of such boards was followed by an immediate improvement and by a rapid decline in the rate of pauperism, especially in the rural areas. The Local Government Act of 1894 modified the system by abolishing the status of the magistrates, who had hitherto been *ex-officio* guardians, and the board now consists of the members of the rural district council and the guardians elected by the urban area if such exists within the union.

Poor law
admini-
stration.

The report of the commission, issued in 1909, on the administration of the poor laws, shows that on the whole the rural boards are far superior to those in the large towns, and that some few, at any rate, are endeavouring

to deal intelligently with the problem of poverty. Too many, however, are content to jog along in a mechanical way, satisfied if they have been as kind to the poor as is consistent with keeping down the rates, but with no thought of a policy for eradicating the evil. The rural guardians, as a rule, are painstaking and conscientious, but usually ill-informed and without any true grasp of the problems to be solved. It is thus not surprising that statistics of pauperism show only small signs of improvement.

Law and
order.

The rural districts of England are essentially law-abiding, and statistics show that crimes are much less common in these areas than in the more densely populated portions of the country. This is due, no doubt, to the fact that the people, though poor, are seldom in a state of destitution, that the agricultural labourer has but little inventiveness or initiation, that the criminal classes prefer the towns and would find difficulty in acquiring a country domicile, should they desire it, but most of all to the fact that in small sparsely-populated communities the actions of each individual are well known to his neighbours and public opinion acts as a powerful restraint. Beyond such technical offences as driving without a light after dark, the chief crimes are drunkenness and poaching. The former is considerably on the decrease, as it is no longer fashionable among the younger men, while the latter is often the work of the town-dweller.

County
police.

The members of the county police are no doubt far more efficient than the village constables, who kept order a century ago, and as they are not natives of the village, and rarely remain in one post more than five years, they are less liable to act in collusion with the disorderly characters in the areas under their charge. Their duties are usually light, and would be less were it not that their services are frequently required at a distance on the occasion of race meetings and other large gatherings.

The police, under their chief constable, are governed by the joint standing-committee, which is appointed by the justices of the peace and the county council. In practice the majority of the members are usually magistrates,

so that the police are practically controlled by the commission of the peace. Though there is not, as a rule, a magistrate living in each village, there is usually one within three miles, and his services are required to deal with any emergency that may arise. But the majority of the cases can wait until the petty sessions, which are held at frequent intervals at almost every market town.

The county is mapped out into petty sessional divisions, which approximate to the areas known as rural districts though they do not invariably coincide. If the urban district round which the petty sessional division centres is a borough, justice is there administered by the borough magistrates under the presidency of the mayor, otherwise it forms part of the division. The cases that can be decided at the petty sessions are limited, as are the sentences that can be imposed; more serious crimes are committed to the quarter sessions, which are held at the county town, where all the magistrates of the county assemble, or to the assizes, over which a judge presides.

The magistrates are still drawn in a great measure from the landed gentry, as was formerly invariably the case, and it is still not uncommon for the eldest son of a county magnate to receive his commission soon after attaining his majority. But in recent years many other types of men have been added to the bench, which has also been much modified by the addition of the successive chairmen of rural district councils, who receive a commission, automatically, on being elected to the chair. Justice is, on the whole, administered as impartially by country benches as by the magistrates of boroughs, though they have been accused of special severity in the case of poachers. It frequently happens that there is on the bench at least one former member of the bar, and this serves to ensure that due weight is paid to the evidence given.

Until the Methodist revival, at the end of the eighteenth century, Nonconformity was rare in country villages. The Puritan movement of the seventeenth century had left the agricultural villages practically untouched, except in some of the midland counties. The control of ecclesiastical

Courts
and
magis-
trates.

Noncon-
formity in
villages.

affairs was still largely in the hands of the vestry meeting, which made considerable use of its power. The vestry consisted mainly of occupiers of land, and these formed the bulk of the inhabitants at that time; but with the improvements in agricultural methods, which began early in the eighteenth century and continued for the next hundred years, the landholders became fewer and the class of landless agricultural labourers increased. Church matters came into the hands of a small oligarchy of tenant farmers, and the interests of the labourers were ignored. The pew system, too, by which seats were allotted to certain houses and lands, accentuated the grievances, for the landless labourers had nothing allotted to them but the free seats, which were few in number, uncomfortable, and in an unsuitable position. Thus grew up a cleavage between the land-holding and landless classes, which tended to increase as time went on, and the labourers, feeling that they were not wanted, ceased to attend the church.

The
Evan-
gelical
revival.

While this state of things was at its height came the Evangelical revival, which devoted itself especially to the poor, the outcast, and the landless. The Methodist movement was particularly strong in the agricultural villages, and there sprang up immediately a number of little meeting-places or chapels, not only in the villages but in the more remote hamlets. These chapels were but humble structures of brick and thatch, but their simplicity appealed to the uncultured labourer, who had been somewhat awed by the magnificence of the parish churches. The practice of Methodism was to encourage self-government, and the labourer with ambitions, instead of being the outcast in the free seats of the parish church, found himself a person of some importance in the village chapel.

Nonconformity has since then attracted the more intelligent of the labourers, and the chapel has been for them a centre not only of religious life but of culture and social well-being. Such labourers as had more personal connexions with their masters, as the servants of the squire or the parson, still continued to attend church, for

their chances of employment often depended upon their doing so, and some labourers, who had only recently descended from the small landed class, remained in the church's fold from habit or family tradition. Otherwise the poorer classes tended to drift to the chapel, except those on the verge of destitution, who attended intermittently at church for what they could get, and were particularly in evidence on those feasts at which dole charities were distributed.

The Oxford Movement, in the middle of the nineteenth century, served as a counterblast to the Evangelical revival, and attempted to recover for the church what it had lost during the previous century. Appealing largely to the senses, it was more successful in the slums of the great towns, for its pageantry was more attractive to the town-dweller than to the rustic; but in some cases, after years of patient work, some villages were converted to its views. Its success among the villagers was not, however, commensurate with the energy and self-sacrifice expended. The farmers as a class did not approve—they disliked innovations; the labourers, in the majority of cases, preferred the humble homely chapel, with its thatched roof, to the finest display of nineteenth-century Gothic architecture and revived mediæval ornaments. Most of the churches in the country were renovated rather than restored under this régime, and many a humble church, which had stood unspoiled from the Middle Ages, was destroyed to make room for a new Gothic structure by one of the host of architects that this movement produced.

It is difficult to sum up the present position, for villages now vary immensely according to their history during the last century and a half. Speaking generally, Methodism—either Wesleyan or Primitive—is still the prevailing religion of the labourer, while the farmers attend morning service at the parish church; but it is by no means impossible to find a parish, where, as the result of the Oxford Movement, a hearty congregation of all classes can be found regularly attending the church, and the

The
Oxford
Movement
in villages.

The
present
position.

chapels have been converted into mission-rooms or clubs.

Signs are not wanting that the acute competition between church and chapel is lessening, and although active co-operation on religious matters has not been reached, the authorities of both have in many cases established more friendly relations, and sometimes act in concert when the social and moral welfare of the village is concerned. This is not confined to the cases where the clergy are of an Evangelical type, for it is by no means rare for a clergyman of distinctly ritualistic tendencies to work in complete harmony with his Nonconformist parishioners on secular occasions. The two movements have been carried on side by side for many generations until each has learnt a lesson from the other. The High Churchman has learnt to understand better the point of view of the labourer and to arrange his ecclesiastical affairs on a more democratic basis, while the Wesleyan has discovered that art, especially music, may be a useful handmaid to religion. Perhaps the fear of modernism is before the eyes of both, though as yet it has scarcely penetrated into the village.

Health.

The English villager is proverbially healthy, and lives as a rule for threescore years and ten, while nonagenarians are frequently to be found. Epidemics are not common, and are usually mild. The death-rate is low, the birth-rate is high, while the rate of infant mortality is far below that found in urban areas. These facts are not clearly seen in the published statistics, as many a small town and industrial village is included in the returns of the rural areas; but if these are removed, the healthy condition of the remainder, the truly agricultural villages, is remarkable.

The healthy state of the people in the villages is the more surprising when we study the conditions under which they live, and particularly when we inquire into the condition of the cottages that they inhabit. In the great majority of villages the cottages are low, badly built, with no damp-course, and with very small windows; they are frequently in a bad state of repair, and rarely possess three bed-

rooms. The inhabitants are nearly always crowded, for the families are large, and it can only be due to the fact that they spend the greater part of the day in the open air that they remain so healthy.

The bad quality of the cottages is mainly due to the fact that they do not pay, for the rents charged—often a shilling a week—offer no adequate return on the outlay necessary for building satisfactory houses, however simple. The low rate of the wages received by the agricultural labourer is the reason given for this state of affairs, but a readjustment of wages and rent between landlord, tenant, and labourer, would leave each as well off as at present, while an economic rent would soon lead to the erection of healthy and adequate dwellings. The responsibility of amending this condition has recently been placed upon the district councils, but so far few have shown any signs of taking the necessary action.

Sanitation in the country is extremely simple, and it is only in the larger villages that drainage systems are to be found. The privy with a cesspit has been usual until recently, while earth-closets with buckets are now gradually taking their place. Regular water-supplies are unusual, and most cottages have wells from which water is drawn in buckets by means of a long pole or by a windlass. Pumps are comparatively infrequent.

Owing to the excellent state of their health the villagers do not very frequently consult the doctor; in fact, it is too often the case that the medical attendant is sent for only just in time to be able to give a certificate of death. This is not due altogether to the narrowness of their means, but is largely a question of habit; and of living so far from the nearest doctor, for village practices are uncommon and the nearest practitioner is generally in the neighbouring town. There is also a disinclination to communicate with the doctor by post, and the patient's friends will often be on the look-out for days until a doctor passes through the village rather than send him a half-penny card.

Those who send for medical assistance often obtain

Medical
service.

orders for the parish doctor, though many of the men make use of the medical officer of their benefit society. Few use the dispensary, which exists in most towns, often because restrictions are placed upon the advantages offered to those living outside a certain radius. Medical advice is never so much appreciated as medicine, and many a bottle is procured at the chemist's shop without a prescription; patent medicines are also indulged in to an enormous extent, and sums are spent on such preparations which would be more than sufficient to supply ample medical attendance. The belief in quack specifics is strong, and an invalid, who believes himself to have benefited by such treatment, will pass on the remains of the bottle to some ailing neighbour, perhaps suffering from a different complaint. The passing of the National Insurance Act will probably make a considerable difference to the relations between the villagers and their medical advisers, but until the Act has been in operation for some years it will be difficult to gauge the ultimate result.

Hospitals. Serious cases, especially those needing operations, are sent to the hospital, where they are attended to by the doctors free of charge, though sometimes small fees are charged by the authorities to cover in part the cost of maintenance. Such hospitals exist in every large town and in many of the chief market towns, while even the smallest towns often have a cottage hospital capable of dealing with a few urgent cases. Destitute persons requiring prolonged attention are frequently sent to the workhouse infirmary, as are some other cases requiring less special treatment.

Midwives and nurses. Until recently women were attended in their confinements by unqualified midwives, one of whom existed in most villages. They were usually old women, of much sense and experience, but utterly lacking in training and unaccustomed to modern sanitary precautions. For some years this class had been dying out, while no successors were forthcoming; at last, by the Midwives Act, 1902, such midwives were debarred from practising after April 1, 1907, except to assist a doctor. In the meantime

a supply of qualified midwives was obtained, largely through the agency of county nursing associations, and there are now few villages which cannot command the services of such a nurse.

When the Midwives Act was first promoted the more far-sighted saw that, unless immediate steps were taken, most country villages would be left without the services of a midwife. County nursing associations were formed with a view to training suitable women for this profession, and in the course of a few years a number of qualified midwives, with two years' training in general nursing, were available for country work. Local nursing associations were formed without delay, dealing with large parishes or groups of smaller parishes, and before the compulsory provisions of the Midwives Act had come into force such associations, employing the village nurses trained by the county associations, had sprung up throughout the country. The effect of the work of such nurses upon the general health of the village is already most marked. Trifling ailments are promptly attended to, and the doctor is more frequently sent for when serious trouble arises. Infants are brought into the world under more auspicious conditions, and their mothers receive much useful advice as to the proper way of feeding and clothing them. The village nurse acts as a sanitary missionary, and the general level of health in the village has improved accordingly.

Though the great educational movement of the Renaissance took place chiefly in the towns, and the schools then founded were usually located in the chief centres of population, rural England by no means remained unaffected by the revival of learning. Our evidence for the existence of village schools during the seventeenth and eighteenth centuries is not abundant, but sufficient remains to show that such centres of learning were not altogether absent, and it is highly probable that their number was greater than has been supposed, for such evidence as has been forthcoming is in great measure accidental. Still, at the beginning of the nineteenth century, the vast majority of the poor, in town and country, were

without any opportunities for educating their children, and this because the members of the middle and upper classes had been quick to perceive the advantages of such schools as existed, and had so transformed them as to be suitable only for their own children. With the revival of religious life, which began towards the close of the eighteenth century, came a desire to offer the benefits of education to the children of the poorest, and during the first part of the nineteenth century many village schools were started, so that before the middle of the century there were few parishes in which some attempt in this direction had not been made.

The
work of
the
Churches.

The Church of England was the most active agent in this work, which received an added impetus from the enthusiasm resulting from the Oxford Movement. The country clergy and their families spent many hours weekly teaching in such schools, and in the night-schools for adults which followed, and to them in a great measure is due the beginning of our present educational system. Much as they had at heart the improvement of their humbler neighbours, their efforts cannot be considered altogether disinterested, for in view of the great hold that Methodism had taken over the minds of the labouring classes, it is only natural that they saw in their church schools the means of neutralizing in some measure the effects of this schism.

Thus voluntary agencies, mainly the clergy of the Church of England and their supporters, had provided throughout the country for the education of the people before the Government had wakened up to the fact that it was expedient for them to educate their masters. The country took over the responsibility, by the Education Act of 1870, but, from motives of economy, left the majority of the schools under the management of their former owners, resting content to assist them by means of a grant. As the requirements of the Education Office increased, the burden cast upon those who provided the funds for voluntary schools became proportionately heavier, and though succeeding enactments added to the

grants paid to them, the abolition of the fees paid by the children added still further to the burden.

Unfortunately, as has been stated, the motives of the promoters of voluntary schools were not wholly disinterested, and the Nonconformists became aware that the church schools tended to diminish their flocks. The danger was perhaps exaggerated, for children were quite capable of taking the bishop's prize for Scripture and remaining faithful adherents of their chapel congregation; but there arose a sharp cleavage on the question of religious instruction, and the supporters of church schools, although suffering under what they termed an intolerable burden, resolved to adhere to the system at all costs. Religious
dissension.

The Education Act of 1902, which cast upon the county councils the responsibility of maintaining everything The Act
of 1902. but the fabrics, relieved the strain, but intensified the religious differences, and this bone of contention has hitherto stood in the way of many much-needed reforms. This Act, however, tended to improve the quality of the teaching given, and though it cannot be considered as the final settlement of the question, it is now agreed, even by its opponents, to have been highly beneficial.

One of the results of the Act of 1902 has been to revive Grammar
schools. many of the grammar schools in the small country towns, which at that date were moribund, and many more have been founded in towns where hitherto none had existed. The result of this has been to place good schools at a small cost within the reach of the farmers, a class sadly in need of a better and broader education. The arrangement by which 25 per cent. of the places at these schools are to be reserved free of fees for scholars from the elementary schools has enabled many of the superior labourers to obtain these advantages for their sons, and although the age at which they are admitted is usually too high to enable them to reap the full advantages of the better education offered, instances are not lacking in which the son of an agricultural labourer has reached one of the older universities by means of an open scholarship.

**Continuation
classes.**

Evening continuation schools have not hitherto been an unqualified success in country villages, though in some cases the schoolmaster, if popular and influential among his former pupils, has been able to conduct one satisfactorily. In the last few years fresh attempts have been made to make these classes more popular, and practical work, such as rural carpentry, has been introduced with greater success. Centres for wood-work, cooking, and other practical work, are now being started in the towns and larger villages, and when these become more numerous and evenly spread throughout the rural areas, we may look for better results.

Recreation.

Village recreations partake in some measure of the nature of education, and must not altogether be ignored ; foremost among these we must mention horticultural and agricultural shows. Few villages now exist without a flower-show, and though the amount of competition is often less than it should be, the effort of managing it is a powerful stimulus to those who serve on the committees. The revival of folk-dancing is having a good effect where it has been started, and this sometimes leads to competitions and entertainments, which serve to enliven the villages.

Cricket, football, and hockey clubs are sometimes to be found, though in the smaller villages the numbers available make it an uphill task to keep the club alive. The same is true of village clubs and reading-rooms, though these are sometimes successful, especially when combined with a rifle club. The 'boy scout' movement is having a great effect upon the younger generation, and will make it easier to sustain these institutions as time goes on. But in these matters, as in others, the drawback is that the more promising boys leave the village for the towns or the colonies and the less enterprising alone remain.

Wages.

The wages in agricultural villages are low, and when not raised artificially by the competition of some local industry, the remuneration is usually at the rate of 12s. a week, though of late there has been a tendency for this to be raised to 13s. But this statement needs qualification,

and ignorance of these qualifying factors has misled many who have written and spoken on the ill-paid lot of the agricultural labourer. The great majority of farm labourers are hired by the year, either at Michaelmas, as is usual in Wessex, or at the beginning of the year, as is customary in Mercia. At the conclusion of the year a lump sum, varying from £2 to £5, and sometimes exceeding the latter figure, is paid to the labourer, being wages deferred to the end of the term to ensure the fulfilment of his contract. There is also very frequently a certain amount of work paid for by the piece, for which higher remuneration is received, besides in some cases a bonus paid on the safe arrival of calves, lambs, or foals. A cottage is sometimes provided rent-free, and this is occasionally supplemented by a gift of coal and wood, or manure for the garden. On the whole, the regular farm labourer seldom receives less than 16s. a week when all allowances have been reckoned, and if he pays rent for his cottage and garden it is generally at the rate of a shilling a week. He is, on the whole, as well off as the labourer in the small town earning £1 a week, or, in the large town, 24s.

The garden is a great asset to the country dweller, and from it he obtains no inconsiderable amount of the food consumed by his family. While some villagers bring their gardens and allotments to a high pitch of cultivation, the ordinary farm labourer is backward in this respect, and tends to devote too much space to the cultivation of potatoes. A few villagers keep fowls and bees, but this is rare in the case of farm labourers.

The village shop caters for many of the wants of the village, but where railway facilities enable the villager to obtain easy access to the neighbouring town, the good housewives attend on Saturdays to buy the cheaper goods that are offered by the various stores. The village shop is too often now only resorted to when credit is required, and the number of bad debts is considerable.

It was customary in former times for the thrifty to deposit in the savings bank the money due at the end of

Expendi-
ture.

the year as well as all small windfalls, and many had thus saved £200, the interest on which now supplements their old-age pensions. This custom appears to be falling into abeyance, for the present generation are inclined to spend their earnings as fast as they are received.

A large proportion of the villagers have belonged to benefit societies, often, however, to small village clubs, which have sometimes ended disastrously. The introduction of the National Insurance Act has caused all to join approved societies, and many are paying for advantages beyond those offered by the state department. Little attempt is, however, made to save money and obtain a small capital, for the ordinary villager has no ambition to rise beyond the sphere in which he finds himself; he has neither enterprise nor commercial instincts: if he had the capital he would be quite unable to make use of it.

To sum up, the villager has a small income, but is rarely in a state bordering upon destitution; his chances of advancement are small, but the desire for an improvement in his status is usually lacking. He is, on the whole, contented with his lot, and if not altogether happy, neither can he be described as miserable. His life is monotonous, but he seems not to require variety, and when a holiday is offered he seems disinclined to take advantage of it.

The
feeble-
minded.

It has been stated that the brighter and more enterprising children seldom stay in the villages, but seek for better employment in the towns or colonies. This means that the dull and stupid alone remain, and the intellectual level is visibly lowering. To this cause must be ascribed the astonishing increase in the feeble-minded in the rural districts, for these breed prolifically, and, amid healthy surroundings, their death-rate is not abnormal.

The
migration
to towns.

It may be surprising that, with healthy surroundings and economic conditions not really inferior to what obtain in the towns, so many of the better type of villagers leave to seek their fortunes elsewhere. The causes are varied, but among them we may reckon the following. Though

the net wages in the towns are little better, and often worse, the spending power is greater. There is a dearth of cottages in most villages, and those existing are in bad repair and offer insufficient accommodation. The evenings are dull, there are few amusements, while the glare of the street lamps offers attractions to the young. The chances of advancement in the country are few, and many a young man fancies that he has the marshal's baton in his knapsack, often to find out his mistake too late. Lastly, the farmer is as a rule little interested in the welfare of his employees, and is unsympathetic in his treatment of his men. This is due less to ill-nature than to lack of education, but it operates as a powerful factor in dissuading the more ambitious youth from following his father's occupation on the land.

CHAPTER XVI

SCOTTISH VILLAGES AND COUNTRY LIFE

BY H. M. CADELL

DURING the past half-century a notable change has taken place in Scottish rural life and habits. In former times, before the days of railways, and the advance of machinery and the introduction of the new system of free education and local government, there were many sources of rural occupation, and, in spite of bad sanitation, and in education nothing but the three R's, more contentment and simplicity were common than is general among the present well-instructed generation. The old Scots tongue is becoming obsolete in the lowlands, and it is even beginning to be considered a mark of vulgarity to use the broad Doric accent and the expressive old words and phrases so dear to a former generation. Music-hall doggerel often takes the place of the beautiful old Scottish melodies at popular entertainments, and the good and

Change in
Scottish
habits.

once paramount influence of the Kirk has considerably declined. The tendency of recent legislation has been to undermine the old Scottish aspiration to thrift and manly independence, and in some of the lower strata of society it is becoming commoner every year for the individual to follow the Irish method and look to the Government for some kind of support all the way from the cradle to the grave, instead of struggling resolutely onwards and relying on strenuous personal effort to build up a solid character and a useful career in life. The more strenuous or independent-minded young men, of whom happily there are many, often prefer to emigrate to Canada to push their fortunes in a land where there is felt to be less State interference and where, if there is perhaps more risk to life and limb, there is also more personal liberty for the subject.

Social
ameliora-
tions :
diminu-
tion of
poverty.

While this is so, it is also equally certain that the public health has improved, and the level of social life has greatly risen, and if taxation is heavier, there is also more ability to bear it. The general well-being of the people has steadily advanced during the last quarter of a century. While the rich have grown richer, pauperism has diminished enormously, independently of old-age pensions, which only affect a comparatively small proportion of all the recipients of public relief. The proportion of persons in receipt of parochial relief reached its maximum in 1868, when there were in Scotland (excluding lunatics) 40 paupers per 1,000 of the whole population. In 1912 this figure dwindled down to 19, or less than half. In some rural parishes the diminution in pauperism has been twice as great as this, and, indeed, cases of extreme poverty and social misery exist mainly in the slums of Glasgow and other congested cities and not in the country villages and towns, and these, when considered along with the rest, materially raise the general average.

Diminu-
tion in
crime.

While the general well-being of the community is thus improving, the amount of crime of various sorts has at the same time greatly diminished, particularly since 1907.

In 1912, although there was more crime and drunkenness than in 1911, there were fewer sentences to penal servitude than in any year since 1906, and there was no capital sentence at all. This general diminution in crime is ascribed mainly to the growth of temperance, the gradual substitution of tea for whisky and beer as a beverage, and to the influence of counter attractions to the public-house. Among these must be counted kinematograph exhibitions established in most towns, to the great advantage of their owners in the first place, no doubt, but also to that of the general public in the second.

In the county of West Lothian, for example, where the population is of a mixed character, partly engaged in agriculture and partly in mining and other industries, the number of convictions for crime for the year 1907 was 2,032, while in 1912 it had fallen to 1,258. In 1913 the number of convictions rose to 1,419, and the police authorities attribute the increase in crime to the exceptionally high wages that prevailed throughout the year. During this period there was a steady increase in the industrial population, which at the census of 1911 was 80,155.

Scots country-folk are peaceable and law-abiding, and most of the local crime consists of trivial offences. During the great coal strike in 1894, which lasted for seventeen weeks, and the national five weeks' strike in 1912, there was little or no rioting or disorder such as was common in Wales and some parts of England during the labour disputes. The drunken and disorderly element largely consists of casual and Irish immigrants and habitual tramps, who form a bad, if small, social ingredient in some rural and all industrial communities.

Two-thirds of the population of Scotland inhabit the industrial belt between the Forth and the Clyde, where all the more important coal-fields are situated. Outside this carboniferous area the main industry is agriculture, with fishing along the coasts and shipping at a few large seaports. Besides its shipping, Dundee has for long been the centre of a large jute industry, independent of the

Distribution of population.

natural resources of the ground. In recent years another new source of occupation, also independent of coal, has been opened up at Foyers and Kinlochleven in Inverness-shire. The abundant rainfall in that moist region has been impounded in an immense reservoir high up among the mountains of Lochaber, and the energy of the water in its descent to sea-level has been transformed into electricity, and thus used in the manufacture of large quantities of aluminium. This is perhaps but the beginning of a future source of rural occupation of great importance to parts of Scotland where there are no other natural resources to maintain a considerable population. A large seam of ironstone has lately been discovered and is being mined in the remote island of Raasay off Skye, and this, too, will give fresh employment to a poor local population.

Decline of
rural in-
dustry.

While there are thus prospects of better employment in some places where the climate is bad and the natural resources are small, there are large districts of declining population where the old cottage industries have been destroyed, and almost nothing but agriculture is left as a source of rural livelihood. In the earlier part of the nineteenth century, there were multitudes of meal and flour mills along all the lowland rivers, there were water-mills for linen, forges worked by water-power, spinning, weaving, and nail-making at home, and now nearly all these home industries are gone, and most of the mills are marked by heaps of ruins covered with moss and overgrown with docks and nettles. Coopering, candle-making, basket-making, tambouring, and thatching were likewise old village industries that have disappeared, leaving little or nothing to take their place. No doubt there are large hotels for tourists, and golf-links requiring some caddies and keepers, but these are not producers of anything really useful, nor do they maintain a large and steadily industrious population.

Agriculture.

The mainstay of the lowland districts outside the more exclusively mineral areas is agriculture, and in recent years this industry has been quite prosperous. While

politicians are in the habit of citing the miserable existence and the low wages of agricultural labourers in England and Ireland, very little is heard about the condition of farmers and their workpeople in central Scotland, where, in spite of good rents, there is neither poverty nor discontent. The case of Scotland, and especially the Lothian district, deserves to be stated by an unprejudiced observer unaffected by the din of party politics, as it exemplifies the need and the result of individual character, energy, and brains in developing any cultivable bit of land, whether it be in Midlothian or Manitoba. It is these personal qualities steadily applied for the last 150 years that have reclaimed vast quaking bogs and stony wildernesses, covered them with farms and made the desert places to blossom like the rose, without the help of legislation or any special virtue in the soil, and have placed Scottish agriculture far ahead of that of Ireland and many parts of England, where the soil is equally good and the climate better. It is not Acts of Parliament, but the application of sound brains and dogged energy that is really wanted to make the land yield its best fruits for the use of man.

The extreme depression that began in the early seventies and continued for over thirty years has gradually disappeared, and the prospects of British farming are now quite favourable. The rise in prices of fat stock and cereals, and the growing efficiency of modern agricultural methods and labour-saving appliances, have made good farms much sought after. Whenever a farm becomes vacant, there are perhaps a dozen or a score of applicants for it from every quarter, sometimes even from Canada. Prosperity of farmers.

Farm labourers' wages have automatically increased as skilled men are becoming scarce, and, indeed, capable men can hardly be obtained at some places owing to emigration, small families, and not enough apprentice boys learning to plough and handle horses. Good horse-men and cattlemen in the Lothians get 22s. a week, plus free house and other perquisites; they have no rates to pay, and their whole earnings may be taken at 26s. Farm labourers' social condition.

a week, about double the pay of less efficient men in some parts of England and Ireland. They work, as a rule, six days a week and have to attend to the milking of cows and feeding of cattle and horses and other necessary light work on Sundays. There is thus no regular weekly half-holiday and but little time to spend money on amusements. On this modest income the married men manage to bring up good families in decency and comfort, and there is not any poverty or discontent among them. When there is illness, the farmers' habit has been to allow them six weeks' full pay, and in nine cases out of ten the recovery takes place long before that interval has elapsed. But when the Insurance Act came into force this kindly relationship was in some cases strained. It appeared, as the farmers had in many cases anticipated, that there was no need of including this very healthy class among the insured at all, as by the kindly old system the rare cases of sickness were met in a far better way than by the Act.

Undesirable effect of Insurance Act.

Holidays for farm labourers.

While there is no regular weekly half-holiday, farmers often let their men off half a day or a whole day when work is not pressing. But when in one field on a Saturday afternoon a football match is perhaps going on in a mining district, and in the next a ploughman is drawing his lone furrow, it is natural for one of the players or more likely for one of the onlookers, who, by the way, never works more than eleven days a fortnight, to shout over the fence an invitation to the man of industry to leave off his monotonous job and join the crowd of pleasure-seekers. It is natural that he should sometimes wish to accept the rough invitation, and, indeed, in some districts an agitation for a weekly half-holiday for farm labourers has lately begun, especially in the northern counties and in districts where the old bothy system prevails. In these localities, instead of married men with cottages, single men are largely employed and lodged in 'bothies' where the social conditions are unfavourable, and existence is dull and depressing. In such districts farm servants are often migratory, and largely outside

religious influences, and there is much room for improvement in their social condition. So far as holidays are concerned, the difficulty, from the farmer's point of view, is that, however much he may sympathize with the idea, agricultural work depends for its success so largely on weather that it would be often a very great loss to him to let all his men off on some regular specified day that might be the very time when there was most need of them all to be at work on the land. The most discontented people are often those with the largest wages and the most holidays, and it has often been remarked that when a married ploughman flits, it takes a couple of good carts to carry his household goods to the next farm, but when a miner, with twice his pay, has to move, as he often does, a wheelbarrow or two is often all he needs.

The proposal to create small holdings, either for owners or tenants, does not find much favour among practical men, at least in central Scotland. The main reason is that land alone does not pay to cultivate in lots of less than about 60 to 100 acres, and market-gardening is only profitable near large towns. Ploughing requires a pair of horses, and 60 acres is what a pair of horses require to work advantageously. There is a great demand for farms of over 100 acres, but smaller farms are generally given up after a time unless the owner has some auxiliary occupation, such as fishing or letting his house to summer visitors. In former times there were many small-holders in some districts, especially near towns and collieries, where much carting had to be done. The carting was the auxiliary trade that kept the small-holder in funds, and when railways were introduced or pits became exhausted, the holdings had to be given up, and became merged in larger farms. Except in the neighbourhood of cities or places where there is a ready market, and where manure is easily obtained, or other occupation is available, there is no probability of smaller holdings than 100 acres ever becoming an economic success.

Small
holdings
impracticable.

Another reason why small holdings have become more

The
housing
question.

impracticable than ever is the cost of erecting the necessary buildings, and perhaps the introduction of a water-supply and drainage. With the rise in the price of materials of all kinds and the increase in tradesmen's wages and local rates, house-building has become nearly 50 per cent. dearer than it was twenty years ago, and house rents have not risen in the same proportion. It is thus impossible, even if it were otherwise advisable, to do more than the minimum amount of building on a farm that is to yield an economic return to the proprietor. Recent legislation has closed many old cottages, and discouraged the building of new ones.

Proprietors who can afford to develop their estates have, until recently, greatly improved many of the cottages and farm buildings. In Scotland the tenant of a cottage prefers a bed in the kitchen near the fire, and cottages are always built with this in view. The English system of a living-room and several very small bedrooms, often without a fire, is not in favour north of the Tweed. The better class of workmen's dwelling has a kitchen with a bed and one or two rooms, or perhaps three, one of which will probably be used as a parlour without a bed. Houses of this kind are being built on many estates and the damp old 'but and ben' is gradually being eliminated. Landlords have long recognized the principle lately enunciated by politicians, that part of the rent should be returned in improvements. Indeed, in some places the taxes and improvements, especially at the beginning of a new lease, absorb not a part, but the whole of the rent for several years to come. Each room in the cheapest class of cottage costs at least £50, and it is hardly possible to build a house with four apartments and conveniences for less than £200. At 6 per cent. the gross rent would be £12, which is more than labourers can generally afford. Off this has to be deducted the repairs and the taxes, so that the proprietor can hope for very little net return on his outlay. The farm cottages, however, are generally included in the lease and free of rent to the labourer, who gets his house, however much

or little it has cost, as part of his ordinary remuneration.

In many parts of the Highlands and the Western Islands, the land is so poor and the climate so wet, that it can seldom be made to yield a decent livelihood and support people who wish to live according to the advanced social ideas of the present day. The barren crystalline rocks of that picturesque region have generally a scanty covering of the poorest class of soil, and this elementary fact appears to be often overlooked by well-meaning but ignorant social reformers.

Conditions
in High-
lands.

Life in such places is, and always has been, a constant waste of energy and a struggle against ever-recurring periods of distress and starvation. Agriculture of a remunerative sort is there almost impossible, and what is mainly wanted is wholesale emigration to Canada, except in places where new industries, such as have been already mentioned, can be established, or where there is good fishing or the possibility of fructifying showers of summer visitors. The writer is well acquainted with these wild abodes of his hungry ancestors, and has visited Nova Scotia and met Canadians whose grandfathers were sent out by the so-called cruel landlords a century ago from such congested areas. They have declared that these old 'clearings' were really the greatest blessings that ever befell their families, and not one of them dreamt of returning to starve amid the barren wilds and peat-bogs of Sutherland, Ross, or the Outer Hebrides, unless perhaps they may have made independent fortunes, and come back to buy residential estates for sporting purposes or sentimental reasons.

Value of
emigra-
tion.

The mining class is a large one in central Scotland, where coal, ironstone, and oil-shale are produced in great quantities. Mines and oilworks have had a period of prosperity, in which the workers have all shared, and the average weekly wages of the pitmen has been over £2. Some miners have been earning more than 10s. a day, and allowing for many holidays, the actual sum paid in wages has often been over £130 a year. With

Mining
and
miners'
wages.

Miners' houses.

perhaps two or three unmarried sons working, a family can have a joint income of £400 or more. With such a revenue coming in and no income-tax to pay, it might be expected that a miner would prefer to occupy a house commensurate with his means. But that is unhappily the exception. However large the pay, the inveterate habit is to live in a house with a kitchen containing a bed, and one or at most two bedrooms with sleeping accommodation for the rest of the family. Here the Scot compares most disadvantageously with his more home-loving English comrade. It is truly a deplorable state of matters that a man whose family income is equal to or better than that of many a clergyman or doctor should persist in refusing to pay a yearly rent of more than £8 or £10 for his house. The cheap and bad housing known to exist in many of the older mining villages, for which colliery owners are often blamed, is partly due to the refusal of their occupiers to pay for better accommodation, or to build good cottages for themselves in spite of the means and the inducement that is often given them to do so. The greater part of the income, instead of being given to the housewife, is wasted on whippet racing, football exhibitions, trips, picture houses, betting, or on drink, although happily not so much on the last score as formerly.

Hours of work and leisure.

The miners work not more than eleven days a fortnight, and sometimes only ten, and have fully two weeks of holidays, besides many others taken at odd intervals, and thus they have much spare time for amusement during the year. They go underground about 7 a.m., and are home before four o'clock, as a rule, when on the day shift. With so much spare time, there is ample room for physical or mental culture, but few of them take much advantage of these golden opportunities, or interest themselves in gardening or self-improvement. There are, of course, some exceptions where men are provident and build cottages for themselves, and in some of the newer mining districts, especially in Fife and Stirlingshire, attempts are being made to lay out tidy

villages on the garden-city principle. In a perfectly new district, where there are no old traditions or inveterate habits to overcome, and where the tenants can be selected from the beginning, these excellent plans may be attended with success.

Co-operative stores are an important and growing Co-operation. institution in most industrial centres in Scotland, and are the means of promoting a great deal of thrift among the operatives. Co-operation, however, on the democratic basis, is not an unmixed blessing. The stores are managed by a committee of the shareholders, who, as a rule, have had no previous business training, and do not believe in injuring the dividend by paying more wages to their own employees than they can help. The management is thus often sadly troubled with the incapacity or dishonesty of underpaid and overworked servants entrusted with the daily handling of much ready-money and goods of great value, and these officials, even if perfectly trustworthy, often complain privately about the tyranny of their employers, and contrast them with ordinary business men in private firms, to the great disadvantage of the former. It is also a public grievance that these wealthy societies, really limited companies making handsome profits, pay no income-tax, because it is presumed by the State that none of the individual shareholders are liable. Another and very natural grievance is that while the societies are thus exempt they displace many individual shopkeepers, who would all have to pay the tax, and thus deprive the State of an important source of revenue.

One of the redeeming features of the somewhat grey Music. life in Scottish mining villages is the instrumental band and the love of music it promotes. Each district has a brass, or more often in these prosperous times, a silver band, with a full set of instruments, worth perhaps as much as £400, and great interest is taken in the performances. Band contests between different districts draw almost as large crowds as football matches, and the judges have on occasion been as roughly handled as football

referees by the disappointed competitors. These instruments are often presented by the local employer or some other popular magnate, and their maintenance and the extensive practisings for the contests and public performances involve the collection of many local subscriptions.

Pipe bands are much more easily maintained, and have become far commoner than they were twenty years ago. Bagpipe playing, indeed, all over Scotland is steadily increasing in popularity. The old game of quoiting is also a favourite and innocent pastime in many mining villages.

County
councils.

The local government in rural places is mainly conducted by the County and Parish Councils, and by the School Board. The County Councils, established in 1889, took over the management of the roads and public health where there was no municipality. The Local Government Act of 1889 was subsequently amended, and the County Council empowered to create a very useful substitute for a municipality in the more populous rural centres. Many small police burghs have come to exist unnecessarily in small villages, and were originated at a time when lighting and scavenging could not be carried out efficiently without setting up the whole municipal paraphernalia. But now, with great advantage to the community, the district committees of the County Council may form separate small lighting, scavenging, and water districts without incurring the trouble and cost of a miniature local municipality. Such areas are managed very quietly and efficiently by small committees, with the aid of the regular county officials, and, indeed, some populous villages or small towns prefer to be governed in this extremely efficient but highly economical and simple manner.

Advantage of
Local
Government Act.

The County Council superseded the old and highly-respectable body, the Commissioners of Supply, who previous to 1889 held office by virtue of a considerable property qualification in the county. The more democratic county councillors require to be elected, but since many of the old Commissioners of Supply, who were

really resident lairds, found it convenient to continue to give the public the benefit of their services and their business experience, it generally happened that the most capable of their number were elected to the new County Councils along with other estimable local representatives, not necessarily men of property. The County Council personnel is thus of fairly high class, and is drawn from a large area, including all the sections of the community that have their own time at their disposal. The county business is generally transacted in an unostentatious and very efficient manner. Peers of the realm, landlords or their factors, farmers, local solicitors, managers of works, merchants, retired business men or independent tradesmen make up the bulk of the representation.

The personnel of the Parish Council is of a more humble Parish
Councils. order. The parish being a smaller area, the choice of capable and willing members is more limited. The meetings are often held at night, when working men can attend regularly and when business men wish to be at home, and the result is that in some parishes the social status has gradually deteriorated, until the councillors have been largely drawn from the same class as the paupers to whom they give relief. This unhappy state of matters is most noticeable in Glasgow and the larger centres, where men of respectability can hardly be induced to undertake the dismal work of parochial relief, and to serve alongside of the kind of people, often of socialistic leanings, who are interested in obtaining seats. In the purely rural districts, however, the Councils contain a large admixture of farmers, clergymen, schoolmasters, and people of weight and respectability in the parish.

While pauperism, as has been mentioned, has notably Lunacy
Boards. decreased all over Scotland during the last forty-six years, lunacy, or as it is now to be called, mental deficiency, has continued slowly and steadily to grow relatively to the population. The asylums are managed by Boards, most of which are composed of representatives from the County Councils, but some by Boards made up of Urban Parish Councillors exclusively. Under the Mental

Deficiency Act, in force from the year 1914, Lunacy Boards have an increased scope, and the new and not very attractive title, 'Boards of Control', is given to them. The Boards that were exclusively composed of County Councillors have one-third of their numbers elected by the Parish Councils, except in the seven large urban areas where the Parish Council is already the Board. The latter class of Lunacy Board, with its inferior personnel, has not been eminently successful in its business and administrative methods, and it remains to be seen how the new system will work out in practice.

School
Boards.

Education has always been a strong feature in Scottish national life, and the School Board naturally occupies a more conspicuous place in the public eye than the Parish Council. The Parish Council, however, has to do with the School Board in one important respect : the education rate is levied by the Parish Council along with the poor's rate. The School Board annually asks for a certain sum, and has not the trouble or odium of raising it. While the poor's rate may be stationary, the school rate is ever growing, and at the same time public discontent with the Education Department is constantly expressed by School Board members, teachers, and ratepayers.

The grounds on which this dissatisfaction is expressed appear to be concerned mainly with the autocratic way in which the Department often orders what it is thought proper to impose for the time being, under pain of withholding the government grant. This is the cause of deep resentment all over the country. The religious question gives no trouble as a rule, the people being nearly all Presbyterians. The trouble arises largely from what is considered the extravagance that the Department demands in equipment and buildings, and its insistence on the vain attempt to teach too many things in the primary schools, without really educating the children thoroughly in the most important elementary subjects, such as history, geography, and the three R's. The teachers complain of too small salaries, although these are constantly being improved, and of the cost and

trouble they endure on account of having new subjects added by the Department, often for but a short time, to the curriculum they have to teach. The increasing cost of living renders higher remuneration necessary in this as in other professions, no doubt, but the ratepayers think, as education is more a national than a local matter, and the expensive-minded Department is beyond their control, the additional cost should be provided by increased grants rather than by higher rates.

No review of Scottish rural life would be complete without some reference to the Kirk, and to the present interesting and instructive ecclesiastical condition of the country. To explain concisely the state of matters in 1914 and write an intelligible review of the whole situation in a few paragraphs is a matter of no small difficulty.

Ecclesiastical conditions.

It must be remembered that the old Roman Catholic Church was particularly corrupt in Scotland, and under the profound influence of John Knox and the early Protestant divines the reformation was very thorough, especially in the lowlands, and in later times Presbyterianism became and has remained deeply rooted in the national life of a perfervid race, and no amount of subsequent persuasion and persecution has been able to eradicate the idea of freedom from priestcraft and State control in the Scottish Church. Episcopacy has little or no hold on the common people, and although it has gained many adherents among the aristocracy, its popular influence is unimportant and not increasing.

In the eighteenth century and the first half of the nineteenth the increasing interference of the State through the law courts led to numerous secessions from the Establishment, mainly due to the abuse of patronage in the appointment of ministers. These smaller secessions were followed by the famous Disruption of 1843, when the great majority of the more active and evangelical ministers and the most liberal of the laymen left the Establishment in a body and formed the Free Church.

Cause of secessions.

The Disruption had, however, more national consequences than one.

Origin of
the Poor
Law.

Before 1845 the poor were provided for by voluntary church-door collections in each parish, but when the Establishment was depleted by the exodus of its best givers, whose liberality was henceforth to be expended on the new Free Churches, these charitable collections, never too large, fell off and disappeared in many parishes, and so this method became totally inadequate for parochial relief. The sum required has thus to be provided by taxation, and thus the Poor Law came into force in 1845, when Parochial Boards were established, to be superseded in half a century by the Parish Councils.

Mollifying
influence
of time.

At the Disruption, religious enthusiasm and public feeling as well as party spirit ran high, and it has taken two generations to mollify the bitterness between the disrupted members of the Scottish Church. But a new generation has now arisen with wider views of Christian duty and Church unity, and the irreconcilables are gradually dying out or modifying their early and somewhat fanatical opinions.

The older dissenting Churches, it must be explained, did not join the Free Church in 1843, but stood aloof and united soon afterwards with one another to form the United Presbyterian Church, politically a radical body opposed to the very idea of a Church established and endowed by the State. The original Free Church members, and Dr. Thomas Chalmers their great leader, were all at first strong establishment men and had no wish to join the so-called 'voluntaries' and suddenly abandon the idea of a national State Church. But although Erastians in theory they were voluntaries in practice, and as time went on they or their children began to realize their duty better and gradually became more friendly to the United Presbyterians. Finally, in 1900 the two Churches joined forces under the name of the United Free Church, about equal in size, and far more than equal in liberality to the Established Church. But here a strange and very unhappy event took place that has produced immense heart-burning and hardship to many good people.

Origin of
United
Free
Church.

The 'Wee
Free'
Church.

There was in the old Free Church a small and dwindling but recalcitrant minority chiefly composed

of ultra-conservative Highlanders who refused to come into any union with United Presbyterians and voluntaries, and stoutly upheld the Establishment principle as a fundamental part of the Church's doctrine. They raised a civil action in which they claimed for themselves all the property and funds of the old Free Church. This claim was unanimously refused in the Scottish law courts, but on appealing to the House of Lords in 1904, it was upheld by the English Lord Chancellor and by a bare majority of his colleagues. The legal Free Church of the 'Wee Free', as it was nicknamed in derision, a body of about twenty-seven ministers, mainly Gaelic speakers, and some 2,000 church members, mostly in obscure charges in remote northern parishes, was thus served heir to the colleges, church offices, and buildings of about 1,000 congregations, and to the endowments that the Free Church had accumulated in 60 years to the sum of over £1,000,000, and was made trustee of an immense heritage that it was ludicrously unfit to administer.

So absurd and unjust was the situation created by the House of Lords that an Act of Parliament was hastily passed in 1905 practically to reverse the decision, and a Commission was appointed to make investigations and hand over to the United Free Church all that the legal Free Church was found incapable of administering. As matters now stand the legal Free Church has still more property than it can handle satisfactorily, and there is considerable need of another Commission to relieve it of the misapplied surplus. This reactionary little denomination is dwindling in numbers and influence. 'Human' hymns and instrumental music are severely prohibited in its services, and its ministers are largely occupied in lamenting the decadence of this evil generation and the disappearance of true religion from the land since 1843.

Curiously enough, although the legal Free Church abhors the disestablishment agitation and upholds the Establishment principle as one of its fundamental tenets, it has no desire to return to the bosom of the existing State Church, which it regards as thoroughly unorthodox

Church
Commis-
sion of
1905.

Proposals
for union
between
Estab-
lished and
United
Free
Church

and vitiated in other respects. The practical result in this direction that is now in the air and causing much interest in Scotland is one for a larger union, between the Church of Scotland and the United Free Church itself. The disestablishment agitation that was so rife a few years ago has in the meantime almost completely subsided, and during recent years influential committees appointed by the respective General Assemblies of the Established and United Free Churches have been meeting together and amicably endeavouring to discover some common basis for an incorporating union that will meet the wishes of all moderate men and broad-minded Christians. There are considerable obstacles in the way of such a desirable consummation of Scottish ecclesiastical history; but the gain would be so great that it is an object well worth striving after. The union in 1900 has led to the closing of a large number of superfluous churches. As numerous rural districts with a declining population have too many churches while the more populous industrial centres have sometimes too few, a larger union would lead to a better distribution of ecclesiastical energy, and more economy in the organization of Christian work. The gain would probably be greatest on the side of the State Church, but one condition of the union would, no doubt, be that the future Church of Scotland would no longer be the *Established* Church in the present legal sense of the term, but the *recognized* National Church, free from every vestige of State control in all spiritual matters. Lay patronage, the main but not the only cause of all the secessions in the past, was abolished in the Scottish Establishment in 1874, and in most other respects the Scottish Presbyterian Churches, unlike the principal Churches in England and Wales, are identical in polity, aims, and doctrine, and friendly with one another, so that the personal, and ecclesiastical obstacles to union are not great, and indeed it is not easy for men who are not born Scots to understand wherein all the causes of difference are to be discovered.



PLATE XXVII. LOCH ALSH. FROM KYLE, WEST COAST OF SCOTLAND
(Phot. O. J. R. Howarth)

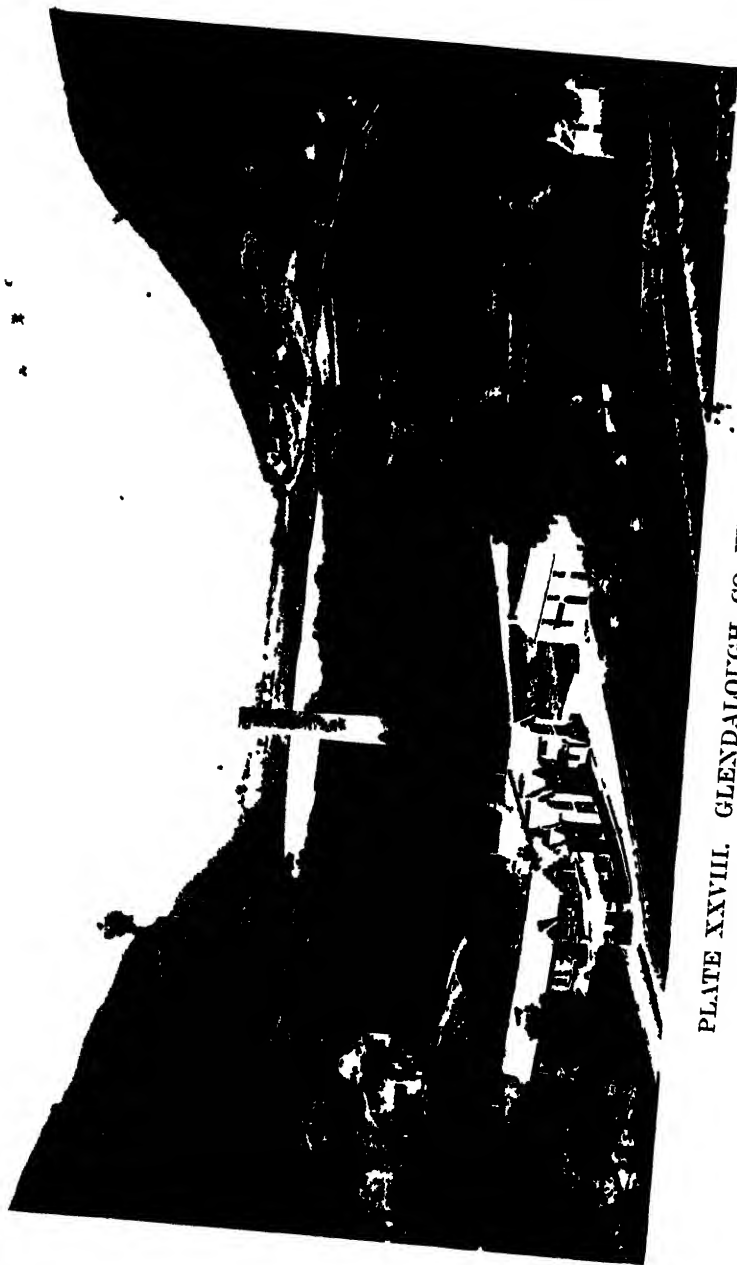


PLATE XXVIII. GLENDALOUGH, CO.-WICKLOW, IRELAND
(Phot R Welch)

CHAPTER XVII.

TOWN AND COUNTRY LIFE AND ADMINISTRATION IN IRELAND

BY PROFESSOR C. H. OLDHAM

At the outset of any survey of Irish life it must be remembered that we are dealing with a country where the population has been shrinking continuously for above 100 years. The 8,295,061 persons of the middle of 1845 have dwindled down to 4,379,076 persons in the middle of 1913. The fact itself is well known. But what has to be borne in mind is the readjustment which this unique circumstance requires us to make when we come to apply to Ireland the rules that we habitually apply to interpret the significance of economic facts in other countries. The movement in population of the different parts of the United Kingdom has been as follows :

Year.	England and Wales.	Scotland.	Ireland.
1801	8,892,536	1,608,420	5,299,000
1841	15,914,148	2,620,184	8,175,124
1881	25,974,439	3,735,573	5,798,967
1911	36,070,492	4,760,904	4,390,219

Now, it is manifest from these figures that economic events such as the growth of exports and imports, changes in the occupations of the people, enlargements of bank deposits, increasing Government expenditure and taxation, &c., will take on a significance when occurring in Ireland which will be wholly different from the meaning to be attached to the same economic events when occurring in England or Scotland. Take, for instance, the fact that the aggregate deposits and private balances in Irish banks have been swelling continuously from £15,005,065 in 1861 to £60,144,000 in 1913. It has often been quoted as evidence of economic progress in Ireland, which it would be if occurring in Great Britain. But, when viewed from the known abnormal circumstances of Irish life, the

fact wears a more sinister aspect and may be interpreted rather as evidence of the distrust felt in business enterprises in Ireland and as a subtraction of the capital much needed for their development. This paradox infects the significance of every economic feature in the life of Ireland. Thus, to give another instance, between 1901 and 1906 the gross railway receipts in Ireland from all sources had 'increased by 30·43 per cent., as compared with percentage increases of 43·61 in England and Wales, and 44·68 in Scotland'. Yet the Viceregal Commission on Irish Railways stated in their Final Report (1910, Cd. 5247, pp. 36, 88) that 'Much of the increase of traffic on Irish lines, especially in the case of commodities produced or producible in Ireland, denotes the reverse of Irish development'. In fact, England and Scotland, during those years, had increased their populations by 18·78 and 17·09 per cent., respectively, but in Ireland the population meanwhile had diminished by 6·25 per cent.

Causes of
diminu-
tion of
popula-
tion.

The percentage of decline in the population of Ireland in each succeeding decennium since 1841 has been 19·8, 11·5, 6·7, 4·4, 9·1, 5·2, and 1·5 per cent. respectively. This decline is commonly attributed to the excessive emigration. But the explanation is not really so simple. More especially in the later decades the emigration has not been chiefly responsible: the excess of births over deaths is so extraordinarily low in Ireland that the 'natural increase' of the population is not sufficient to counterbalance the decrease caused by a moderate emigration. Thus, during the ten years 1901-11, the average annual birth-rate of 23·1 per 1,000 and death-rate of 17·3 per 1,000 yielded a natural increase of only 5·8 per 1,000: meanwhile the average annual emigration was at the rate of 7·7 per 1,000 of the population. In plain figures, 1,023,211 births and 764,811 deaths left a natural increase of 258,400 persons: but emigration removed 345,159 persons of Irish birth during the same period.

We find, therefore, three causes contributing to the decline of population: (1) The birth-rate in Ireland is

extraordinarily low, nearly the lowest in Europe ; (2) the death-rate in Ireland is too high for a population which is so largely rural ; and (3) the emigration from Ireland, which is itself distinguished by some very singular features. All three, however, are but secondary symptoms of the same thing, namely, the bad economic and social condition of the country.

The low birth-rate arises in Ireland from two facts, viz. Birth-rate. the marriages are far fewer in number, and they take place at a far later age than in any other country in the world. The case is, then, quite different from that of France, where the birth-rate is as low as Ireland's, but the marriage-rate is one of the highest in Europe. The constant outflow from Ireland of emigrants of marriageable and child-bearing ages naturally reacts on the marriage and birth-rates of those who remain in the country. The truth is that the young people in the rural parts of Ireland are all intending emigrants : they never think of marrying so long as they still hope to be able to emigrate. Only 44·8 per cent. of the males and females aged 20 years and upwards are married. It is astounding to find that of the women of Ireland in 1911, aged between 15 and 45 years of age, who might be child-bearing, only one in three (34·4 per 100) were married. Yet illegitimate births are only 2·7 per cent. of the total births. And the number of persons to the family, viz. 4·7, is a higher average in Ireland than in Great Britain. No people have ever applied the teaching of Malthus more thoroughly than the modern Irish, yet they have not escaped from poverty.

That the death-rate should be considerably lower in Death-rate. Ireland than in Great Britain will seem natural, having regard to the crowded city life in the one and largely rural life in the other. It was so forty years ago : in 1865 the death-rate averaged about 23 per 1,000 in Great Britain and 15 per 1,000 in Ireland. Since then things have continuously improved in the former country, where the Public Health administration has effected a great change in the health of civic populations ; but in Ireland

the health of the people has meanwhile been steadily deteriorating, owing to the withdrawal by emigration of the most healthy and virile elements of the population. Since 1905 the death-rate in Great Britain has averaged about 15 per 1,000, and in Ireland between 17 and 18 per 1,000—surely a very remarkable change.

Emigra-
tion.

In the third place, we have to consider the emigration from Ireland. Professor Mayo-Smith and other American economists, comparing the immigration into the United States from the various countries of Europe, have noticed that the emigration from Ireland was remarkable in three respects : (1) its great dimensions, relative to the home population at its source ; (2) the large proportion of females, who in recent years have outnumbered the males ; and (3) the small proportion of children among the emigrants—a fact indicating that it is an emigration of individuals, rather than of families. To these three features of Irish emigration we may add two others, viz. : (4) it is drawn chiefly from the rural population, the civic population of Ireland is increasing ; and (5) it rises or falls according as times are good or bad in the United States ; the volume of emigration seems to be little affected at present by the changes of prosperity in Ireland itself. This will be easily understood when it is remembered that the Irish population of the United States is to-day probably four times as large as the Irish population at home. The Irish emigrant now leaves his native shores, not to venture forth among strangers, but to join the other members of his own family who are already in America, and, in many cases, have paid his passage-money for him.

The pre-
sent
effects of
emigra-
tion.

From May 1, 1851 (when the official count of emigrants from Irish ports began), to December 31, 1912, a total number of 4,297,222 persons are reckoned to have emigrated from Ireland, including about 50,000 foreigners. But the tide has slackened considerably, and is to-day but a gentle current : 30,000 emigrants in a population of 4,380,000 means a rate of only 6·8 per 1,000 inhabitants. If Ireland had the same ' natural increase ' as Great

Britain, say 12 per 1,000, the gap caused by emigration would be unnoticed. What is serious is the quality, not the quantity, of the drain: there is in Ireland a perpetual survival of the unfittest, a steady débâsement of the human currency, just as under Gresham's Law bad money continually displaces good money in the circulation. Moreover, those who remain have their minds unsettled: they will make no plans for their future, they will not marry and settle down to make their careers in Ireland until the hope of getting away to America has died out in their hearts, and they are then already past their prime.

Meanwhile a thin streak of British and foreign people filters into the civic population of Ireland. Thus, in 1911 the native Irish numbered 4,233,182 (96·4 per cent.), and the non-Irish 157,037 (3·57 per cent.); ten years previously these figures were 4,326,947 and 131,828 respectively. While the native Irish declined by 93,765 persons (say 2·1 per cent.), the non-Irish increased by 25,209 persons (say, 15 per cent.); net fall of the population, only 68,556 persons during the ten years. As a matter of some interest, it may be pointed out that there was no fall since 1901 in the number of families in Ireland. The families rose from 910,256 to 910,748; and the inhabited houses also rose from 858,158 to 861,879. It is a mere straw, but it shows how the wind blows. The tide of emigration from Ireland has spent its force.

It is axiomatic that emigration affords no appreciable Paupers. relief to the masses of people already reduced to the verge of starvation: the pauper cannot go. Consequently it has no direct effect in elevating the lowest classes of the population. The proportion of the population that gets relieved out of the rates has always been smaller in Ireland than in Great Britain. But during fifty years there has been a steady diminution in progress in Great Britain, and a steady increase in Ireland: so that the proportions who are paupers are now very similar for each. As the conditions on which relief is given are not identical there can be no direct comparison between the

two countries. But we can compare Ireland with Ireland at different dates and Great Britain with Great Britain. Thus, for Great Britain : in the period 1855-9 the paupers averaged 4.6 per cent. in England, and 4.2 per cent. in Scotland ; in the period 1905-9 these percentages had fallen to 2.6 and 2.3 respectively. Meanwhile in Ireland the percentage who were paupers was 1.0 in the former period and had risen to 2.3 in the period fifty years later.

Economic
condi-
tions.

There remains the question whether emigration has relieved the pressure that makes paupers. Whether those who stayed in Ireland are better off, as a consequence of emigration having diminished the competition for employment, is a very difficult question to answer. So many factors have to be allowed for that the answer will generally indicate merely whether the speaker is optimistic or pessimistic at the moment. Thus, the average weekly cash wages of agricultural labourers (without reckoning extras and allowances) has risen in Ireland from 5s. 10½d. in 1854 to 11s. 0½d. in 1908 ; and in England from 10s. 8d. to 14s. 7½d. But meanwhile the life of the world has changed, things are now more upon a cash basis, and a much larger part of the labourers' consumption has to be procured by a cash payment. Then, an Ireland improved absolutely (assuming an optimistic view for the moment) may have deteriorated relatively, for meanwhile other countries have been progressing rapidly. The productive efficiency of the Irish people as wealth-producers will have relatively retrograded if their country has not been keeping abreast of the progress which has been revolutionizing processes and transport facilities elsewhere. Take the education of the people : the percentage of the people of Ireland, aged 5 years and upwards, who could both read and write, was as low as 28 per cent. in 1841 ; it had risen to 87.6 per cent. in 1911. This is absolute improvement of the best kind. Nevertheless, it remains true that in education the Irish people is among the most backward in Europe, in view of the educational requirements of modern industry. Certainly the enforced celibacy of the Irish people, to which the declining population

is now to be attributed, is emphatic testimony of the persistent poverty of opportunity among this warm-hearted race: their improved education leaves them more conscious of their economic limitations. The actual evidence supplied by the figures of the Irish census as regards the 'occupations of the people', when analysed by Sir Charles Booth and other economists, has shown from decade to decade a marked deterioration in the character of employments in Ireland; i.e. the wealth-producers everywhere are diminishing faster than the general decline of the population, while the parasitic occupations, and those who are merely dealing with goods as intermediaries, are everywhere increasing absolutely, in a remarkable way. (See 1895, Cd. 7720, Part II, Appendix 10, pp. 212, 217.)

Ireland has two large cities, Belfast and Dublin; only six other towns are over 20,000 in population, and fourteen have between 10,000 and 20,000 inhabitants. Taking the 'civic' population to mean all those living in the 109 towns with 2,000 or more inhabitants, and the 'rural' population to mean all the rest, then the whole population of Ireland has been made up as follows, viz.:

<i>Census.</i>	<i>Civic.</i>	<i>Rural.</i>	<i>Total.</i>
1861	1,140,368	4,658,599	5,798,967
1871	1,202,844	4,211,033	5,413,877
1881	1,245,503	3,929,333	5,174,836
1891	1,244,113	3,460,037	4,704,150
1901	1,384,929	3,073,846	4,458,775
1911	1,470,595	2,919,624	4,390,219

This remarkable table shows that in fifty years the 'town' has increased its population by 330,227 persons (29 per cent.), while the 'country' has been losing 1,738,975 inhabitants (37 per cent.), the net fall for all Ireland being 1,408,748 persons (24 per cent.). This change in the distribution of the inhabitants may be more simply stated by reducing the population to 100 persons. Thus, fifty years ago, 19.7 persons lived in 'town', and 80.3 persons lived in 'country'; to-day 33.5 persons live in 'town' and 66.5 persons live in 'country'.

It is constantly stated that Ireland is chiefly an agricultural country, and that the Irish people must mainly depend upon the production from the land. The fact that two-thirds of the people dwell in rural areas corresponds exactly with the census returns of the occupations of the people, which show that two-thirds of the male population over 20 years of age¹ follow agricultural pursuits.

It may, therefore, be taken as practically certain that 2,900,000 persons depend upon the land in Ireland. But there is also a town population of 1,500,000 persons who do not depend on the land, except very indirectly, and it is probably the case that this town population produces as much wealth by independent industries as the country population, although twice as numerous, produces by the use of the land. To speak of agriculture as the staple industry of Ireland is to ignore these townsmen who produce one-half of the wealth of the country.

Religions. These 'two Irelands' differ so much that no general statement can be made about the country which really fits both. Through the evil heritage transmitted from the past history of Ireland it is incidentally the case that a difference of religion connotes largely (though not always) a difference of racial stock and of industrial aptitudes in the Irish people. During many years Roman Catholics were excluded from all industrial guilds. It is certainly true that the townsmen are more largely infused with the Protestant elements of the Irish population than are the countrymen. Thus, if the nine towns that are parliamentary boroughs be considered, we find that the Roman Catholics there constitute only 59·3 per cent. of the inhabitants. If we consider the 137 towns with populations over 1,500—the minimum population that entitles a town to obtain local self-government under the Towns Improvement (Ireland) Act, 1854—we find that

¹ To reach this conclusion it is necessary (and reasonable) to assume that two-thirds of the 131,377 males, aged 20 years and upwards, who returned themselves as 'general labourers', and are included in the industrial class under that designation, are really *Agricultural Labourers*, though not so describing themselves. (Census Final Report, 1913, Cd 6663, p. 15.)

the Roman Catholics form only 62·2 per cent. of the inhabitants. If we consider the rural areas outside those 137 towns, we find that there the Roman Catholics are 80·1 per cent. of the inhabitants. For Ireland as a whole the Roman Catholics were 73·9 per cent. of the population in 1911.

During the nineteenth century the economy of Ireland was subjected to two disturbing influences which have changed the whole basis of economic life, for both town and country, with revolutionary completeness. The one was free trade, which began in the year 1824, the other was the introduction of railways and the cheapening of ocean carriage. The year 1824 is the turning-point in the industrial history of Ireland. The post-Union protective duties (amounting to about 10 per cent. *ad valorem*) then ceased, and Huskisson's Act (4 Geo. IV, c. 72) established free trade between Great Britain and Ireland. In 1824, also, a common system of weights and measures for both countries was adopted. More important still, in 1824, regular cross-Channel steam navigation began: for the City of Dublin Steam Packet Company, between Dublin and Liverpool, and the G. and J. Burns line of steamers, between Belfast and Glasgow, both date from that year. About this same time, in 1828, the application of machinery to the wet-spinning of flax led to the modern linen factory, and (by a local circumstance enabling the obtaining of long building leases there) to the concentration in and around Belfast of an industry previously spread widely through the homes of the Irish peasantry, especially in Connaught. Thus, since 1824, industrial Ireland has undergone an astonishing transformation. Along with the decay of the industries of the countryside, there went forward a prodigious stimulus to the commerce of Ireland, and to the building up of a new growth of industries on a scale far larger than the capacity of the local market for consumption. From the year 1824 we must date the growth (1) of the modern linen trade; (2) the Irish porter and whisky exports; (3) the large live-stock industry, which displaced the old-time Irish

The rise of
modern
industry
in Ireland.

trade in salted meats ; and (4) a great Irish grain trade to Great Britain (a preferential market until 1845), which reached its greatest development in 1838, but only began to fall away rapidly after 1861, in face of the competition of the American prairie produce. The foundation of Belfast shipbuilding dates from the arrival there at Christmas 1854 of Edward James Harland, then aged 23 years, who in 1859 founded the firm of Harland and Wolff. The modern factory woollen industry of Ireland is also to be dated from the fifties, being much advanced in the eighties.

Causes of
rural de-
cay in
Ireland.

A curious controversy is to be found in the Majority and Minority Reports of the Viceregal Commission on Irish Railways issued in 1910 (Cd. 5247) as to the effect produced by the introduction of railways upon the economic condition of Ireland. The Minority Report, wishing to minimize the pessimistic views of the Majority Report, argued that ' there is a marked difference between their effect upon agriculture and their effect upon manufacturing industries. Broadly speaking, we believe that they have greatly benefited agriculture by facilitating the access of Irish produce to British markets, while they have tended to check the development of Irish manufactures by facilitating the import of British goods into Ireland ' (*ibid.* p. 85). But this argument will not square with the facts, just mentioned, of industrial development, and it will not explain the decay of rural employment in Ireland.

Irish agriculture during the nineteenth century has had to face two revolutionary changes. During the Napoleonic wars, when England was isolated, the agriculture of Ireland was developed on a tillage basis, with a large export trade in grain. This tillage system became precarious after the Peace of 1815, and had to collapse after the repeal of the Corn Laws in 1845. The transition from tillage to stock involved the displacement of the redundant rural population. Upon this calamity followed the second, viz. the fall of agricultural prices, attributable in part to foreign competition after the railways of the United States had been built, and in part

to the general appreciation in the value of gold during the thirty years after 1873. This second calamity necessitated the prolonged agony of the 'Land War in Ireland' to obtain a reduction of rents, and finally the expropriation of the Irish landlords by an onerous operation of land purchase. In all this disturbed period of social readjustment the rural parts of Ireland were handicapped and economic development was impossible.

The result has been that Irish farming has fallen into a dilapidated condition, and the usage of the soil of Ireland has become deplorably uneconomic. To indicate the facts we may display in a statistical form (here drawn from Mr. Cyrus Adams's text-book on *Commercial Geography*) the manner of using the surface of the country as followed by other European nations, viz. :

	<i>Danes.</i>	<i>Dutch.</i>	<i>Swiss.</i>	<i>French.</i>	<i>Irish.</i>
Arable Land . . .	42.5	27.7	16.5	52.4	11.1
Hay, Pasture ^e . . .	28.2	34.7	35.9	11.3	64.1
Forest . . .	4.6	6.0	18.4	18.3	1.5
Vineyards . . .	0.0	0.0	0.8	3.7	0.0
Unproductive. • . .	24.7	30.7	28.4	14.3	23.3
Total area . . .	100.0	100.0	100.0	100.0	100.0

We are here viewing agriculture as the means of living for two-thirds of the population of Ireland—admittedly one of the most fertile lands in Europe. We are comparing Ireland with countries having about the same proportion of 'unproductive' surface. Such a fact as that 64.1 per cent. of the land surface should be given up to grass is unparalleled in the world ; and the pitiful 11.1 per cent. devoted to ploughed land offers no adequate basis for the employment of the agricultural population. To speak of agriculture as being the staple industry of Ireland is, therefore, ridiculous in the face of the facts. In its ship-building, its linen cloth, its brewing and distilling, its tobacco manufactures, its woollen tweeds and hosiery goods, its rope-making, and delicate lace fabrics, Ireland has industries that may stand, quality for quality, alongside the best producers of similar goods anywhere in Europe. But in the arts of using a most fertile soil in the business of agriculture, it is but a ruined land, wasted

and withered by the fifty-years-long struggle to settle the question of land tenure. Hence and so grievous is the contrast now visible in the town and country life of Ireland !

The territorial divisions of Ireland.

The Local Government (Ireland) Act, 1898, supplied the means of effecting a great simplification in the territorial subdivisions of Ireland for local rating and administrative purposes, which was carried out in detail by Orders issued by the Local Government Board for Ireland before the close of that year. This simplification involved the discarding of the 'barony' as a unit administrative and rating area—a change regrettable in many ways to Irish feeling, for the baronies were the best-known subdivisions of the counties and of great antiquity, being originally regarded as territories belonging to distinct septs or clans among the ancient Irish, then becoming feudal and military jurisdictions, and in course of time being constituted into public civil divisions for fiscal and administrative purposes. The Poor Law Union, set up in 1838, has become the administrative unit of local government in Ireland, by a process of accretion of new functions which cannot be here explained, though in itself most interesting and curious. Now, in 1898, all Ireland was covered by 159 unions and 325 baronies. To the averaging mind that looks like the barony being one-half a union. But tribal lands probably scorned averages. 254 out of 325 baronies covered parts of more than one union ; and, of the 3,438 distinct 'electoral divisions', into which the 159 unions were subdivided, above 550 were situated in several baronies. To reduce this overlapping—to keep each barony within the bounds of one union, and each 'electoral division' of the union within the bounds of one barony—was a problem found too impracticable to be solved. Thus the barony, like the civil parish, has now dropped out of Irish life.

The territorial divisions now in use have been plotted out so as to enable two types of local government bodies to operate without friction, viz. County Councils and District Councils. The unit of area for the former is the

'administrative county', which is no longer the same thing as the old judicial county. The unit of area for the latter is the 'county district', which may be either urban or rural, but its district council is the sanitary authority for the district. The cities and towns were brought into the scheme in the following manner. The six largest boroughs—viz. Belfast, Dublin, Cork, Londonderry, Limerick, and Waterford—were styled 'county boroughs', i.e. each now ranks as an administrative county of itself. These six county boroughs have all the powers given to an urban district, and their councils are district councils too. All the other towns which were boroughs (under the Municipal Corporations Act of 1840), viz. Clonmel, Drogheda, Kilkenny, Sligo, and Wexford; or towns and townships (under the Towns Improvement Act of 1854, and particular Local Acts), were thrown into their respective counties; but, being urban sanitary districts, their councils are Urban District Councils, whether so styled or not—for 'nothing in this section shall alter the style or title of the corporation or council of a borough'.

The counties of Ireland for judicial purposes were 32 in number, until Tipperary was subdivided in 1838 into North and South Ridings. These 33 areas have now had their boundaries slightly improved in shape—for example, a town like Athlone spreading into two counties, Roscommon and Westmeath, has been reduced within the bounds of a single county by annexing the Roscommon part of the town to the area called Westmeath, and there were other similar adjustments: and the 33 reshaped areas are (together with the six county boroughs) the present administrative counties. For the purposes of electing county councillors, the administrative counties are further subdivided into 'county electoral divisions' with fairly equal populations, each electing one councillor. As settled by Local Government Order, there are 680 county electoral divisions for the 33 administrative counties. This does not mean that there are only 680 county councillors. Besides the elected councillors, the

The local
govern-
ment
councils
of Ireland.

chairman of every rural district is an *ex-officio* member of his County Council, and the councils have also the power to co-opt one or two additional members. The number of county councillors, apart from the county borough councillors (who number 296), was 1,055 in 1899, and 968 in 1914.

Turn now to the smaller areas within the administrative counties which elect the District Councils. The number of Poor Law Unions in 1899 was 159 (since reduced by one): of which 113 lay wholly within one county, 38 in two, and 8 extended into three counties. Under the Public Health Act, 1878, the area of every poor law union (after omitting any portion which is included in any urban sanitary district) forms a rural sanitary district. Again, by the Local Government Act, 1898, when a union is divided between more than one county, each divided part (so far as it is not contained in an urban sanitary district) is to be a separate rural sanitary district. And each rural sanitary district has its own separate rural district council. It follows, therefore, that there are 213 Rural District Councils in Ireland. Then every urban sanitary authority, under the Public Health Act, 1878, is *ipso facto* to be an urban district under the Local Government Act, 1898. Apart from the six county boroughs there are in Ireland 89 Urban District Councils, 5 of which are entitled Municipal Boroughs. Now for the election of district councillors, the county districts, urban and rural, are further subdivided into 'District Electoral Divisions': these being identical with the former Poor Law Electoral Divisions, except that in no case does a district electoral division extend into more than one county. At the Census of 1911 there were 3,673 of these divisions in Ireland. In the rural districts each such electoral division returns two rural district councillors. But whenever such electoral division is in a town, or part of a town, the Act empowered the Local Government Board to assign to it more than two district councillorships: and the Order made for the purpose selected 31 such divisions to which

additional district councillorships were assigned, bringing their quota up to a total of 105. That accounts for about 7,500 rural district councillors who are elected *ad hoc*. Then every Rural District Council may co-opt three additional members, and any one thus co-opted is also to be a guardian *ipso facto*. Including the urban district councillors, it will be seen that nearly 9,500 persons are members of District Councils in Ireland. A parliamentary return gave the number as 9,456 district councillors in Ireland (H.C. 2, of 1901).

Not every district councillor is a guardian : in point of fact the parliamentary return just quoted gave the number of guardians in Ireland as 8,803, distributed among the 159 Poor Law Unions of that time. Every rural district councillor, whether elected or co-opted, is a guardian also : i.e. there is no separate election of guardians as such. But in the urban districts guardians must be elected *ad hoc*. There are 161 district electoral divisions lying wholly or partly in county boroughs or urban district areas : and the Local Government Board's Order assigned altogether 570 guardians to be elected as such from these 161 divisions. If a union happen to lie wholly in one county, and no part of it is contained in an urban sanitary district, then the members of the rural district council are the same persons who constitute also the board of guardians : 80 out of the 159 unions were in this position in 1899. But otherwise, where a union is situated in two or three counties, then those individuals who (together with the guardians elected by any urban district within the union) constitute one body as guardians will be divided into two or three bodies as rural district councillors. Consequently the Act allows the board of guardians to choose their chairman and vice-chairman, and the persons so chosen may or may not be the same as those chosen to fill those offices by the body acting as the district council. Women may now fill any position in any of these local government councils in Ireland : for though the Act of 1898 excluded women from County Councils and County Boroughs, a subsequent Act passed in 1911

(1 and 2 Geo. V, c. 35) has provided that 'a woman shall not be disqualified by sex or marriage from being elected or chosen councillor of any county or borough, or an alderman of the council of any borough'. She may not, however, if chosen as chairman of one of these bodies, become thereby a justice of the peace. The Act applies to Ireland only.

The
success
of local
govern-
ment in
Ireland.

Having set out the constitution of these local government bodies, we do not propose to describe their powers or sphere of operations. They have superseded the local government functions of the Grand Juries in the counties and of the Baronial Presentment Sessions in the rural districts. The County Council now levies and collects the poor rate, except in urban districts: there the Urban District Council is bound to hand over to the County Council on demand its apportioned amount of expenses. Extensive powers are conferred upon the Local Government Board of Ireland to grant by provisional Order, without any special enactment by Parliament, additional powers for local government purposes: thus all the powers of an urban authority under the Public Health Acts may be conferred now upon Rural District Councils by the mere issue of Local Government Board Orders. Two or more County Councils may take joint action through joint committees. Thus, in the provision of district asylums for the lunatic poor in Ireland, the former 'governors or directors' for each asylum, and the general 'Board of Control' are now all abolished, and their duties are imposed upon the County Councils. There are twenty-four such district asylums, so that a district often extends into two or more counties; in which case the district asylum is now managed by a joint committee of the County Councils concerned, and these counties defray the expenses of the asylum in proportion to the number of lunatics from each county, during a standard period. The systematic procedure by which the various grants-in-aid, formerly voted by Parliament, are now paid out from the 'Local Taxation Account', including the agricultural grant, gives the Lord Lieutenant



PLATE XXIX (a). LAKE PLAIN OF CONNEMARA, IRELAND,
FROM THE TWELVE BENS



PLATE XXIX (b). PART OF THE TWELVE BENS, CONNEMARA
(Phot. O. J. R. Howarth)



PLATE XXX. THE 'LOADED CAMEL' AND OTHER WEATHERED GRANITE ROCKS, ST. MARY'S, SCILLY ISLES
(Phot. W. M. Sutcliffe)

effective powers to compel the County Councils to act up to the full measure of their duties in this and other matters.

Taken altogether, the present system of local government in Ireland works with marvellous smoothness and efficiency. If it be true that 'the best school for the development of sound political qualities is the school of local institutions, wisely organized, firmly supervised, and administered with common sense', then this ideal has certainly been attained, and this school is to-day operating effectually in Ireland.

CHAPTER XVIII

THE SCILLY ISLES

By O. J. R. HOWARTH

Position
and physical
conditions.

THE Scilly Isles lie about 30 miles south-west of Land's End (Cornwall). They form an archipelago of islands and isolated rocks, estimated at 200 in total number, and thickly set within an area of 50 square miles, or a parallelogram measuring 10 miles by 5. The granite axis or backbone of Cornwall falls beneath the sea at Land's End, but its rugged summits re-emerge in these isles, and the connexion between them and the mainland is seen on a bathymetrical chart as an uplift some 8 miles wide at its narrowest part between the contours of 40 fathoms, below which depth the slope is very gentle. The Arthurian tradition of the lost territory of Lyonesse is associated with the submarine portion of this ridge. The Scillies, rising abruptly from the general submarine level, reach no great elevation above the sea; no summit exceeds about 160 feet. The summit slopes of the major islands are gentle and bare. The scenery is not as a whole grand, but an archipelago, as a natural feature, is never devoid of natural beauty, and the Scillies are far from that state. Their rocky flanks are often steep or sheer; the granite is weathered into picturesque shapes, and many of the smaller islands and isolated rocks are of even noble figure. The scenic effects of the archipelago depend in large measure upon atmospheric conditions and the setting of the sea. The islands are exposed to the Atlantic Ocean, and many vessels have been wrecked on them, notably on the outlying rocks known collectively as the

Western Isles, where, at the south-western extremity of the archipelago, the famous Bishop lighthouse stands on the rock of the same name. The voyage to the archipelago from Penzance (40 miles), from which regular steamship communication is maintained, is of rather ill repute for roughness among visitors, whose number, however, is considerable and of recent years has grown. An exquisite climate, boating under the expert pilotage for which the inhabitants are famed, excellent sea-fishing, and rock-climbing, are named among the attractions offered them.

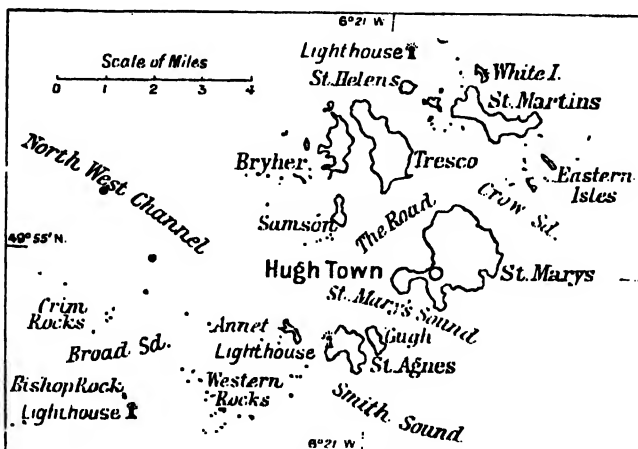


FIG. 58. The Scilly Isles.

Five islands are inhabited, St. Mary's, Tresco, St. Martin's, St. Agnes, and Bryher. The total population in 1911 was 2,097, and about seven-tenths of it inhabits St. Mary's, the largest island, where the capital, Hugh Town or St. Mary's, is situated on a low isthmus between bays, in the northern of which, facing the relatively sheltered roadstead within the archipelago, is the harbour.

The occupations of the islanders were formerly associated mainly with the sea; fishing remains important; ship- and boat-building, kelp-burning and the like have been so in the past. But the chief industry of the islands

Indus-tries : flower-farming.

is now dependent on their climate, which is remarkably mild and temperate. The mean temperature in the winter months hardly falls below 47° F. ; that in the summer hardly exceeds 58°. The mean annual rainfall at St. Mary's is about 32 inches, the months of heaviest precipitation being December, November, and July, and those of the lightest, May and June. The indigenous flora of the islands includes a number of well-known bulbous flowering plants ; and during the last quarter of the nineteenth century the cultivation of bulbs for the early flower-market in London was initiated and developed with great energy and success. Many different kinds of bulbs were introduced from the Low Countries and elsewhere, and now, from the end of December to June, the picking, packing, and dispatch of the flowers fully occupies the population. The industry superseded that of growing early potatoes and vegetables, which was never so successful. The tall hedges, often of the pink-flowering cscallonia, which narrowly divide the flower-fields for the sake of shelter, are a characteristic feature in the scenery of the islands. Apart from this industry, the vegetation of the islands is beautiful ; fuchsias, roses, and many other flowers are seen blooming at midwinter ; the aloe and the dracaena palm flourish, and though trees are generally absent save in such sheltered situations as that of Holy Vale (St. Mary's), the gardens of Tresco Abbey, which is the residence of the lord-proprietor of the islands, are famous for their wonderful collection of exotic plants and trees. The sea spleenwort (*Asplenium marinum*) is one among a number of the rarer ferns which form an important group in the indigenous flora.

Fauna.

Over forty sea-birds and some sixty land-birds, visiting or resident, are enumerated, and some very rare visitors have been recorded, such as the Iceland gull, the golden oriole, the snow-bunting, the haw-finch, and even the eider duck and crane. The fisheries, as has been said, are rich, notably the mackerel-fishing from May to June, and the crab and lobster fishery, in which the trade is chiefly with France ; these fisheries are carried on partly by

Cornishmen and fishermen from more distant ports. Sport is provided by the pollack, wrasse, mackerel, chad, bream, conger, and other fish.

The Scillies are without mineral wealth, though the classical Cassiterides or Tin Islands used habitually to be identified with them, if not as a centre of early tin-mining themselves, then as an imaginary trading centre, where the Phoenicians met the natives of Britain, and exchanged their wares for tin. This identification is obsolete; nor does the present name of the islands find any certain explanation. The islands, however, were inhabited in prehistoric times, and a number of barrows, kistvaens and other remains may be seen, as on St. Mary's, Samson's, and elsewhere. ^{Early habitation.}

The islands are attached for parliamentary purposes to the St. Ives division of Cornwall, and their local affairs are administered by a council, but the lord-proprietor (as his title suggests) stands in a peculiar position of personal responsibility towards this isolated community, and since the property was acquired in 1831 by Augustus Smith, the inhabitants have greatly benefited under this system of governorship. ^{Administration.}



FIG. 59. The Channel Islands.

CHAPTER XIX

THE CHANNEL ISLANDS

General

BY DR. R. R. MARETT

CONSIDERED in the light of their physical geography, the Channel Islands form an appendix to north-western France ; just as, on an ampler scale, the British Isles form an appendix to the continent of Europe. In other words, regional features prove more instructive than local features, whether those of the Channel group as a whole, or those of particular islands, when a broad survey is taken of past, or even of present, conditions.

The geology of north-western France has occupied the attention of many able men of science, amongst whom Dr. Charles Barrois may be mentioned *honoris causa*. To do justice to their opinions concerning the secular history of the region would be a complex task, calling for more space than is available here. Suffice it to say, then, that the foundations of this tract of country (including the Channel Islands) appear to have been laid down before and during the Palaeozoic era, within an area of depression where sediments were being amassed beneath a gradually deepening sea. The upper limit of this formative period is furnished by the grand upheaval of the Armorican Arc in the course of the Carboniferous period ; which finally determined the structure of the existing surface. Ever since, we may with some confidence affirm, dry land has prevailed in these parts ; though we may have to allow for occasional subsidences, involving partial or complete occupation by the sea. Consequently subaerial denudation, a far more destructive agent than marine erosion, for all that its activity is less obvious to the senses, has hereabouts enjoyed full

Geology :
Palaeozoic era.

scope ; with the result that there remains nought but the shaved-down, though still prominent, basement of what formerly may have been, as a leading authority on geotectonics puts it, ' one of the greatest folded systems of the globe ' (E. Suess, *The Face of the Earth*, Oxford, 1909, iv. 36). The Armorican Peninsula, in short, is a venerable ruin ; and the Channel Islands represent its most isolated and battered fragments. If, however, there are few traces, whether in the islands or in their neighbourhood, of what has taken place on or near the surface of the country up to comparatively recent times, there is compensation to be found in the opportunity afforded here of studying the part played by subterranean forces in the building of these ancient lands.

Effects
of sub-
terranean
agencies
on forma-
tion.

The stresses and transformations effected by such agencies as pressure and wet heat are seen everywhere, especially along the rugged coasts. The hard cores of the islands are granitic ; and it is plain to view how the molten magma has again and again been forced upwards so as to permeate and enclose existing formations, the successive intrusions doubtless ranging from Archæan right on to Carboniferous times. Of sedimentary rocks only two or three types are to be met with, and these are unfossiliferous, and have all the appearance of belonging to the very base of the Primary. A shale or graywacke, which may be correlated with the ' Brioverian ' series of Dr. Barrois (Briovera = St. Lô ; whence the old name for this formation, ' Phyllades de St. Lô '), constitutes the heart of Jersey, having been preserved by three containing bosses of granite ; and likewise occurs in a much metamorphosed patch at the extreme west point of Guernsey. This formation may be put down as of pre-Cambrian or, at latest, Cambrian age. Interesting effects of local contact-metamorphism are to be observed in Jersey wherever this shale meets the eruptive rocks. That we have to do here with a genuine sedimentary deposit, however metamorphosed towards the margin, is proved by well-developed ripple marks in the centre of the formation at St. Lawrence Valley. On Alderney,

forming a small promontory to the north-east, and the adjacent Île du Ras, as well as on the Casquet rocks to the west, are patches of a gritstone, which may in turn be correlated with the *Grès Armoricaïn*, recognized as belonging to the Ordovician system. (In Jersey at the Corbière there have recently been found some rolled fragments of sandstone, wedged in a crevice, and apparently forming part of a former raised beach, which contain Devonian fossils ; but whether they are of local origin is, to say the least, doubtful.) Finally, at the north-east corner of Jersey is about a square mile of a curious conglomerate that is at any rate later than the Brioverian shale, since some four-fifths of the contained pebbles are derived from the latter, the remaining fifth coming from igneous rocks. Whether the conglomerate is to be classed as of aqueous origin, since the rolled look of the pebbles on the face of it suggests a mud-bound littoral deposit, or must be reckoned a volcanic stew which has fused the edges of the shattered materials produced and intercepted during its outburst, may be left an open question (contrast, for instance, C. Noury, *Géologie de Jersey*, Paris and Jersey, 1886, and J. Sinel, *Geology of Jersey*, Jersey, 1912) ; but in the meantime there is no ground for supposing that this formation also is of anything but quite primæval age. For the rest, the trend-lines revealed by these stumps of former mountains, so limited in extent, so scattered, and so eloquent of hypogene disturbance, are naturally somewhat hard to make out ; yet there is good reason to think that they may be traced in a general easterly or north-easterly direction from the north coast of Brittany across the islands to the Cotentin, as Suess, following Barrois, shows in a map (op. cit., iv. 46 ; cf. M. Lévy, *Bull. Serv. Carte géol. France*, 1894, v. 318). Not only the lines of strike but likewise the intrusive veins, as notably the frequent and conspicuous dykes of diabase, those ‘natural seismographs’, which in this case not improbably testify to the actual birth-pangs of the great Carboniferous upheaval, follow this broad tendency from west to east ; nor are

there indications that in pre-Carboniferous times the tectonic lines were greatly different, being related, it would seem, to one and the same continuous lateral pressure, such as would be exerted when a zone of the earth's crust was slowly subsiding (cf. Barrois, *Proc. Geol. Assoc.*, xvi. 132). In any case it must be remembered that here, as elsewhere throughout the world, these first pages of the book of nature are mostly torn and burnt beyond the hope of detailed reconstruction.

Mesozoic
era.

Of Mesozoic times not a vestige remains, at any rate *in situ*, whether in the islands themselves or in the Armorican region as a whole. Hence we may probably assume the continuance of dry land, at least into the Cretaceous period. Whether the deep-sea conditions implied by the deposition of the chalk are to be extended so far to the west is a matter of hypothesis. Certain it is, however, that in the raised beaches of Alderney and Jersey no less than along the present shores of all the islands, and even, it is said, occasionally on the higher levels of Guernsey deep down in its soil-cap, flints occur in more or less abundance; despite the fact that the set of the tidal current is eastward, so as to rule out the possibility of these enigmatic flints being derived, at least under conditions at all similar to those now obtaining, from the beaches of Picardy or from the English downs. Dr. Barrois would make the Loire responsible for the flints discoverable in the raised beaches of Western Brittany (*Ann. Soc. Géol.*, ix. 265); but to apply such a theory to the Channel Islands is decidedly to strain it, and it seems simpler to bring this part of the Armorican region within the limits of the Cretaceous sea, or at least to allow the sea in question a westerly development over some adjacent area.

Neozoic
era.

Of Tertiary deposits such as can be at all approximately dated the islands show few signs. For Brittany a Miocene submergence covering the lower lands is postulated, with a more cataclysmal invasion of the sea during the Upper Pliocene. The latter event may perhaps be held to account in the main for the thick spread of loess or

brick-earth, containing occasional rolled stones, which covers both the Côtes du Nord and the Channel Islands, down to the more outlying islets and stacks, with what must once have been a continuous mantle. Certainly surface-weathering, though a *vera causa*, seeing that the decomposing veins can often be followed upward into the subsoil, which to the same extent likewise answers in colour and composition to the solid rock below, will not of itself suffice to explain the characteristic soil-caps of the islands. These here and there attain to a depth of 50 feet along the general plain of erosion, which averages between 300 and 400 feet in height; while movement to lower levels, doubtless assisted by snow-slide and copious rainwash during the Glacial Period, has piled it up even more deeply in certain of the valleys and bays. (See A. Dunlop, *Quart. J. Geol. Soc.*, 1889, p. 118.) Sub-glacial conditions must likewise be invoked to show cause for the 'head' of rock rubbish mingled with clay which forms a constant feature of the cliff scenery of the islands. Even if these lay beyond the range of the Brittany glaciers, and signs are consequently wanting of the direct action of ice, their westerly position would entail very copious falls of snow during the visitations of extreme cold which punctuated the Pleistocene period; and effects would follow such as cannot be expected under present conditions. This 'head' overlies a raised beach reaching normally a height of 25 to 30 feet above ordnance datum; whereas its relation to another group of raised beaches, 50 to 70 feet in height, which is probably of later age, is not so clear. In addition, Jersey possesses at South Hill a single raised beach of no less than 140 feet (see Dunlop, *Quart. J. Geol. Soc.*, 1893, p. 523), which, being unique, is perhaps the oldest member of the series. With these proofs of frequent submergences (of which, however, none was deep enough to overtop the main plateau of the islands) must be combined the evidence for two emergences sufficient to connect Jersey with the mainland in mid-Pleistocene and again in Neolithic times. Three caves exhibit clear proofs of occupation by Mous-

terian man, who has left behind him near his former hearths the bones of a Pleistocene fauna, including the woolly rhinoceros and the reindeer, which doubtless needed more than the present island in which to expatiate. Submerged forests, on the other hand, with which Neolithic man is shown by his associated remains to have been contemporary, could not have grown in place had not Jersey been more elevated at the time by at least the 60 feet necessary to make it continental. Whether Guernsey, which also has submerged forests, but needs three times as much elevation to be united to France, was continental at either of these two epochs must remain uncertain in the absence of equally definite proofs.

Changes
in eleva-
tion.

For Jersey a reasoned catalogue of the changes in the elevation during Pleistocene and recent times has been tentatively drafted by the present writer (*Archaeologia*, 1911, 449 f., cf. *ib.*, 1912, p. 103 f.) on the strength of the latest archaeological discoveries of the Société Jersiaise as well as of the earlier geological observations of Dr. Dunlop and others. The scheme on the opposite page (reproduced by permission of the Society of Antiquaries) will be better understood in the light of the particulars set forth there and in the footnote below.¹

¹ The following epochs are referred to by the letters on the diagram facing this page:—

A. Submergence indicated by high-level raised beach, South Hill, Jersey. Unique, hence probably oldest. Perhaps Pliocene.

B. Submergence indicated by low-level raised beaches, below 'head' but above some of the loess, and by sea-worn caves. Probably Upper Pleistocene.

C. Submergence indicated by mid-level raised beaches and sea-worn caves. Later than B, since this raised beach overlies low-level sea-worn cave at Le Cané de la Rivière, Jersey. Upper Pleistocene (to judge by small amount of cave-earth below Mousterian floor in La Cotte de St. Ouen, Jersey, sea-worn, with raised beach at 60 feet level, comparatively late in the Upper Pleistocene).

D. Emergence indicated by Mousterian occupations in three caves, with remains of continental fauna. Middle Pleistocene.

E. Return to present level, or possible submergence, indicated by marine gravel (up to 18 feet above O.D.) below Lower Peat, Tunnel Street, Jersey. Probably Late Pleistocene.

F. Emergence indicated by Lower Peat (the submerged forest needing at least 60 feet elevation to have grown in place), with Neolithic remains in it. Neolithic.

G. H. Submergence, followed by return to present level, indicated by marine silt (up to 25 feet above O.D.) between Lower and Upper Peat, Tunnel Street, Jersey. Probably Post-Neolithic.

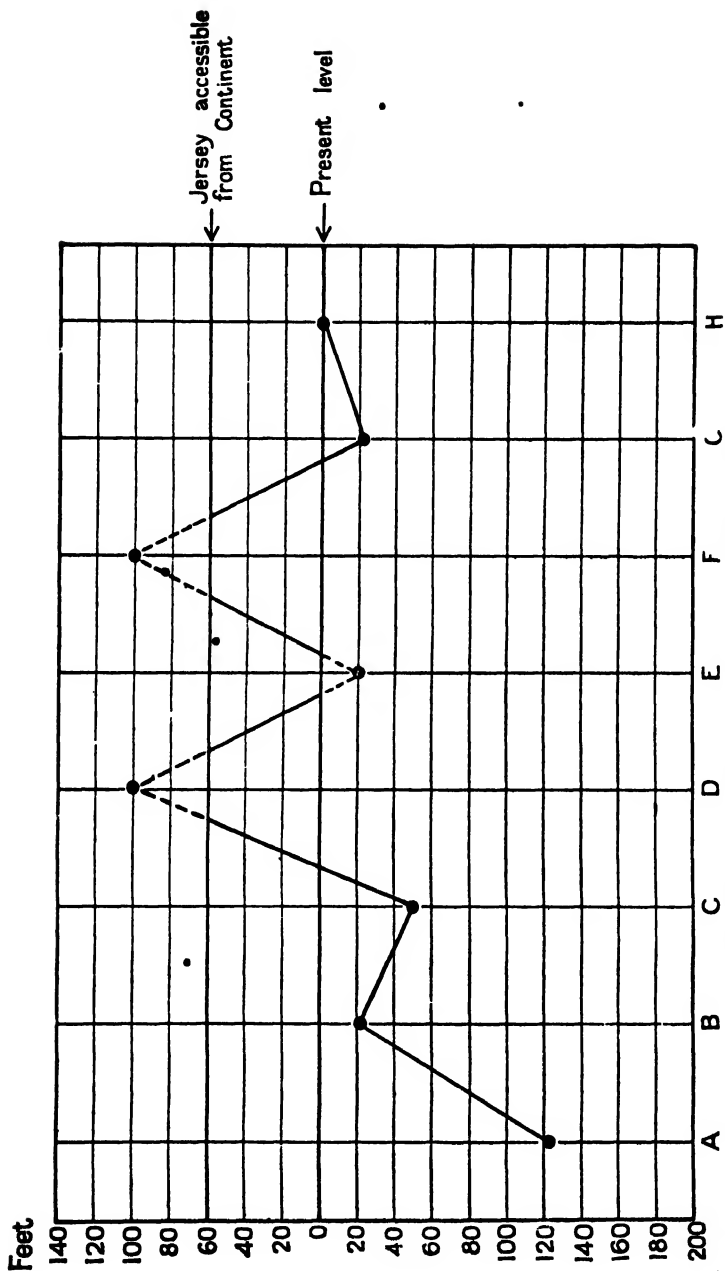


FIG. 60. Changes in the Elevation of Jersey, as shown by the changes in Mean Sea-Level.

[N.B.—The difference between mean and high tide-levels, roughly 20 feet, must be added to get height of raised beaches; e.g. 120 feet submergence = 140 feet raised beach. For references to letters, see footnote on opposite page.]

Con-
figuration
of the
land

If, following the isobathic curves, we imagine this part of the Channel to be raised 180 feet, we should have an expanse of land, some 3,000 miles square, including all the islands and rocks. To south and east this territory would be continuous with France, while on the side of the sea a line running 25 miles due west from Cap La Hague to the Casquets, and thence branching off south-south-west for 65 miles, so as to pass just outside Guernsey and the Roches Douvres to the coast of Brittany, would enclose a well defined trapezium, breached somewhat by the sea towards the centre of the line facing the Atlantic. A section taken from north to south across the surface so elevated would reveal a sharply serrated edge ; Alderney, Guernsey, Jersey and the Minquiers providing the principal teeth, while everywhere minor peaks would bristle in the gaps. Northwards, this mountainous tract, strongly recalling western Brittany in its broader features, would be seen to plunge abruptly downwards into what is now known as Hurd's Deep, and was formerly the ancient bed of the Greater Seine. As things are now, however, the sea covers all but some 75 of this imagined, but formerly visible, 3,000 square miles. The remnants of land form two natural areas, a southern and a northern which coincide (if exception be made of the Îles Chausey, which are French) with the existing units of political administration. The southern area comprises Jersey (45 square miles) with the adjacent rocks, the chief of which, the Ecrehou and the Minquiers, provide occasional places of abode for a few of the Jersey fishermen. The northern area includes Guernsey (24.5 square miles), Alderney (3.06 square miles), and Sark (nearly 2 square miles), with the smaller Herm and Jethou, all inhabited islands, as well as a perfect wilderness of islets and rocks.

Hydro-
graphy.

Hardly distinguishable from the subject of the distribution of the land is that of the hydrography of the region, since the conformation of the main channels leading past the islands into the cul-de-sac of the Bay of St. Malo will alone explain the amazing movements of the tides. The tidal swell sweeping across the Atlantic at a rate of

some 500 miles an hour is pent in between the walls of the English Channel, and the southern portion of it encounters the friction of the submerged plateau from which the islands stand 'up as hills. Thereupon it acquires a movement of translation manifested at once in an increase of force and of height ; and rushing by the islands, through narrow channels which preserve the west and east direction of the regional trend-lines, is heaped up against the barrier of the Cotentin, whence the arrested and broken water is deflected at right angles to rejoin the main stream to the north. High water takes place at Jersey nearly half an hour before it reaches Guernsey and three-quarters of an hour before reaching Alderney. The height of the wave at spring tides is about 40 feet at Jersey, 30 feet at Guernsey, and 20 feet at Alderney, the summit of this rapid slope of the uplifted waters coinciding with the Bay of St. Malo, which likewise retains most of the products of the immense erosion caused by a ground-swell which scours the very bottom of the entrant channels. Meanwhile the complication of currents is endless, seeing that it takes some three hours from the turn of the tide for the northerly flow to develop, which thereafter continues right on to the next half-flood, so that there are always cross-currents to be encountered along its westerly edge ; and this with an inrush of two to three miles an hour in the broadest passages, and as much as eight miles an hour of redirected force in the Race of Alderney. Happily there is a sheltered roadstead to be found in Jersey within St. Aubin's Bay ; and Guernsey has an excellent deep-water harbour at St. Peter Port.

The climate may be described in general terms as of Climate, a modified Atlantic type, since the highlands of Brittany serve to break the first fury of the south-westerly winds, while the accompanying warmth and moisture, the so-called ' Gulf Stream ' conditions, are able to accumulate their effects in so sheltered a corner. The Cotentin, on the other hand, shields Jersey from the easterly and north-easterly blasts so prevalent in spring. Guernsey

is rather more exposed to the winds on every side than Jersey, but, being further away from the mainland, has, by way of compensation, a somewhat more equable range of temperatures. Both islands are too small to collect the passing clouds, and the amount of bright sunshine registered here is consequently remarkable; the average for the winter months being particularly high by comparison with surrounding regions. Indeed, about 45 per cent. of possible sunshine may be claimed for the Channel Islands as a whole, whereas the highest record for any part of the United Kingdom would appear to be less than 40 per cent. In Jersey the mean temperatures, for twenty years, of January and August, the coldest and hottest months, work out at 42.1° and 63° F. respectively, while the corresponding figures for Guernsey are 42.5° and 59.7°. The mean annual rainfall for twenty-five years is for Jersey 34.21 in. and for Guernsey 38.64. Frost and snow are infrequent, and in the fall of the year 'St. Martin's Summer' is wont to delay the advent of the cold.

Flora.

Such a climate invites a rich flora, and some 2,000 species of plants are known to exist in the islands. If the soil be not naturally of the highest quality, consisting as it does of rather heavy and acid loam together with humus and sand, intelligent culture has made up for the deficiency. As Arthur Young puts it, the peasant proprietors of the Channel Islands have turned their sand into gold. Wheat is suited to the island admirably, but at present it is not a profitable article of export, so that it has been ousted to a large extent by potatoes and 'roots'. Grapes do so well under glass without artificial heat that Guernsey is in danger of becoming one vast greenhouse. Tomatoes thrive under glass, and in favourable years provide a full crop in the open. Pears and apples flourish, though the orchards of former days have been much curtailed, while the figs and peaches are of the best. Flowers, notably spring flowers, are cultivated wholesale with great success for the English market. For the rest, the fuchsia and the camellia, the magnolia and the arbutus lend a southern air to the numerous

gardens. The tall cabbages of Jersey and the red lilies of Guernsey assail the eye of the curious. Trees abound in the more sheltered spots and include many evergreen species, but do not attain to a great size, so that there is little or no supply of timber. On the cliffs gorse and heather run riot. The caves offer a grand hunting ground to the lover of ferns. Finally, the multitudinous rocks are smothered in sea-weed, which forms a most valuable manure ; so that 'vraicking', as it is termed, is a characteristic industry which is at once regulated by law and sanctified by festal customs.

Of chief interest to the naturalist is the relative dis-**Fauna.**tribution of the land-animals, proving as this does that Guernsey, separated from France by a channel of some 30 fathoms' depth, was isolated at a much earlier date than Jersey, which needs only an elevation of 10 fathoms to become continental. The subject has been studied by Mr. J. Sihel (34th Bulletin of the Société Jersiaise, 1909, 429 f.), who shows that, as compared with Jersey, Guernsey lacks the toad, the ring-snake, two kinds of newt and two kinds of lizard ; the mole, the hare, the squirrel, and the fox ; the glow-worm and three kinds of butterfly of feeble flying power, the 'skippers'. On the other hand, Jersey has been an island long enough to have developed a species of its own in the bank-vole (*Erotomys Caesarius*), while the shrew, the stoat, the toad, and the green lizard show local characteristics entitling them to rank as varieties. For the rest, the bird-life is somewhat remarkable, showing, as might be expected, a mingling of northern and southern forms. How far migration takes place by way of the islands has not been worked out, though the lighthouses could supply copious data. The red-legged partridge, once so common in Jersey as to have the name of 'Jerseyman', has been exterminated. The chough, though still fairly common about the Guernsey cliffs, is threatened with a similar fate. Insect life is abundant, the species of lepidoptera amounting to about 600, and including several rarities with a curiously local distribution. As regards the marine fauna, the

great fall of the tide offers a magnificent field of research amongst pools and rocks that pullulate with anemones, sponges, and every form of lowly life. Crustaceans are numerous, but on the whole the fishing is poor, the conger-eel and the mackerel supplying the chief catches. Finally each island possesses its breed of cattle, the deer-like Jersey stock having been kept pure from intermixture since 1789, and the Guernsey type, though somewhat more mixed and coarser, proving hardly less valuable as a source of profit.

Ethno-
logy.

Homo Neanderthalensis, as proved by some teeth found in a cave together with Mousterian implements, was once an inhabitant of Jersey; but it remains to be proved that here or anywhere else there survives a drop of his blood. During Neolithic times the islands were thickly populated, to judge by the frequent dolmens; and finds of the Bronze Age are likewise fairly common. Roman coins, again, and some doubtful remains of rough fortifications suggest such conditions as might be expected in a remote and humble appanage of Roman Gaul. Legends that will not bear close inspection refer to the visits of Christian missionaries and, again, of piratical marauders during the dark ages. When the latter form permanent settlements in what thereupon becomes Normandy, the islands may be said to enter on their present ethnological phase. Some anthropological data are available, collected in Jersey by Dr. A. Dunlop from 239 subjects of well-established insular descent (see *Journ. Anthropol. Institute*, xxii. (1893), 335 f.). The mean cephalic index works out at 80.5 (with 67.8 and 87.5 as the extreme limits of variation); which is roughly equivalent to 78.5 on the bare skull. The average height of 110 males is found to be 5 ft. 7½ in.; though, since the system of measurement was confessedly inexact, the true figure may be slightly lower. Black hair occurs only in 10.81 per cent. of the cases examined, and dark eyes only in 24.22. On the other hand, the normal hair-colour is not yellow but some shade of brown, darkish hair and light eyes of blue or grey being a not uncommon combination.

To interpret such data must remain, in the present state of our knowledge, a precarious business. One view would regard the bulk of the population as of a mixed type, in which the so-called 'Alpine' element is the strongest. Peoples of some such type of Celtic speech doubtless inhabited the neighbouring coasts of France in the days before the advent of the Norsemen. The mesaticephaly, however, and the high stature would accord well enough with a Scandinavian parentage; while such tendency as there is towards a brunette coloration points at most to a moderate tincture of that darker strain, which in Scandinavia itself, as almost everywhere in Europe, would seem under modern conditions to have been gaining at the expense of the blonde element in the population. From the cultural side the evidence for the predominantly Norman origin of the islanders is even more convincing. Mr. G. F. B. de Gruchy has shown (*Jersey Soc. in London, Occasional Publications*, No. III) that, whereas unmistakable Norse words abound in the place-names, not a single one of these is to be found which is undoubtedly from a Celtic root; or, again, taking the Jersey surnames, he proves a large number to be of Norse derivation. For the rest, the spirit of the islanders as revealed in their history is fully compatible with such a descent. As Mr. de Gruchy says (*ibid.* 4), 'A race of farmers, fishermen, and sailors, independent, self-governing, trained to arms, passionately attached to their institutions and liberties, very litigious, and with a restless wandering spirit which took them into distant lands in quest of adventure or gain—such were our forefathers, and such are our people still.'

Jersey

BY DR. R. R. MARETT

In point of constitutional theory and strict law the Channel Islands furnish, as Lord Coke points out, the seisin or manifest whereby the king makes good his claim to the throne of England as successor and inheritor

Relations
with the
Crown
and an-
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liberties.

of William the Conqueror. This fact will, perhaps, sufficiently explain why, onwards from the reign of John (when the rest of Normandy was lost), the most ample liberties and privileges have again and again been accorded to the islanders by royal charter. As late as 1607 the reigning monarch refers to them as 'a portion remayning as yet unto us in possession of our ancient Dutchey of Normandie'. In point of fact, however, these liberties have not been maintained without effort and struggle on the part of the islanders, directed principally against French invasion, but partly, also, against the encroachments of oversea representatives of the Crown who sought to usurp the powers of the civil authorities. Of such matters the insular annals are full, and the spirit displayed is always the same, namely, one of unswerving loyalty towards the Crown, combined with no less uncompromising defiance of external and internal oppressors. Meantime, self-centred as they are, the islanders make but occasional appearance in universal history. Thus we hear of them in 1483, when Pope Sixtus IV published a Bull declaring the islands neutral territory, to which in time of war ships of all nations might resort for purposes of trade or of shelter; this sacrosanctity lasted in theory till 1689, though in practice the 'truce of God' seems to have been repeatedly violated. As regards Jersey, its chief title to historical fame consists in its espousal of the Royalist cause in 1649. On the day following the receipt of the official news of the death of Charles I, the States of Jersey issued a proclamation to which the members affixed their names, whereby Charles II was recognized as the lawful king of England; who, in the same year, took refuge in the island, remaining there for nearly five months. The rest of the story, involving an attack of the English fleet under Blake and a seven months' siege of Elizabeth Castle, is woven round the romantic figure of Sir George de Carteret (see *Dic. Nat. Biogr.*). It is also of general interest to note that the latter played a leading part in the colonization of America. His first venture, sanctioned by Charles in 1650, was

nipped in the bud by a Parliamentary frigate ; but, after the Restoration, he held a half-share in the territory named in his honour New Jersey, and was also one of the grantees of the Bahamas as well as of the Carolinas, the last proprietor of which was his great-grandson Lord Carteret.

It is impossible in a short sketch to do justice to a complex of institutions which, handed on, for the most part almost unchanged, from time immemorial, has nevertheless been adapted by the good sense of the islanders to their changing needs, so as to provide an administrative system that has under all conditions worked well. Reference has already been made to the existence of a dual representation of the authority of the Crown in the persons of a bailiff and a governor (now replaced by a lieutenant-governor), whose functions, after much contention, were finally differentiated for Jersey in 1617 : ' We hold it convenient that the charge of the military forces be wholly in the Governor, and the care of justice and civil affairs in the Bailiff ' (see Le Quesne, *A Constitutional History of Jersey*, p. 260). In the administration of civil matters the bailiff is assisted by twelve *jurats*, or justices, elected for life by the people ; in criminal cases the jury consists of twenty-four special jurors. Legislative power rests with the States, consisting of the bailiff and *jurats*, the rectors and *connétables* of the twelve parishes, and seventeen deputies ; six for St. Helier, the parish containing the chief town, and one for each country parish. The attorney-general, solicitor-general, and the *vicomte*, officers whose appointment lies with the Crown, have the right to attend, but have no vote. Alike in civil cases and in legislative matters the last word lies with the Privy Council. Save in the case of Crown appointments, office is honorary, and it is much to the credit of the islanders that there should always be forthcoming citizens able and willing to serve the community not only as *jurats*, but likewise in the various capacities entailed by the elaborate municipal system with its *Connétables*, *Centeniers*, *Vingteniers*, and *Officiers du Connétable* elected by the twelve parish assemblies.

The law of Jersey is founded on the *Ancienne Coutume de Normandie*, and, although it has developed along lines of its own, retains many curious survivals, as notably the *Clameur de Haro*, and various feudal dues levied on property. A picturesque ceremony is the *Assize d'Héritage*, at which twice a year the Seigneurs who hold from the Crown do homage for their land, and the various officials, including the *Avocats de la Cour Royale*, also swear fealty (see Le Quesne, *ib.*, 30 f.).

Militia.

The duty of national defence has always been recognized by the islands as incumbent on all citizens, and the service is borne cheerfully, though gratuitous (save for camp-allowances), personal, and obligatory. The establishment of the active militia is at present fixed for Jersey at 1,800 men, and service lasts for ten years, with continuance in the Reserve up to the age of forty-five. At least 1,000 men must annually undergo nine days' consecutive training in camp. The Crown assists, having provided arms as far back as the year 1224, and clothing from 1780 onwards.

Religion.

The conversion of the islands to Christianity is the subject of legends which place the event in or about the sixth century A.D. During the Middle Ages they were attached to the see of Coutances, being transferred to that of Winchester by a Bull of 1499. Owing, doubtless, to the influence of French exiles of the reformed faith, a Calvinistic type of Protestantism has tended to prevail here from the sixteenth century onwards. The ecclesiastical canons and constitutions for the Church in Jersey were finally settled in 1623. It was provided that the Dean, who must be one of the rectors and a Jerseyman, should be judge in the Ecclesiastical Court, where the remaining rectors sit as his assessors with the right to offer advice, which the Dean may or may not accept. The Bishop of Winchester may intervene on appeal being made to him, but not otherwise. Thus it appears that in ecclesiastical as in civil matters there prevails the same large measure of insular autonomy (see Le Quesne, *loc. cit.*, esp. chap. v.)

The islands, in their extreme conservatism, retain dialects in which are preserved the main forms of the ancient *Lingue d'Oil* of Normandy; so much so, that the *Roman de Rou* of Wace, a native of Jersey, who wrote in the early part of the twelfth century, is still largely intelligible to an islander familiar with his native tongue. Moreover, not a few terms of purely Norse origin, such as *bel* and *hogard* for farmyard and stack-yard, still persist in the current language. At the present day the islanders can likewise all speak English, and mostly French as well; such bilingual or trilingual powers serving them in good stead when they go forth to make their fortunes in the outer world. The general standard of education is high. In Jersey two free grammar schools were founded in the reign of Henry VII; and in 1852 Victoria College, supported out of public revenues, was established on a liberal basis permitting very moderate fees to be levied on students. Moreover, thanks to an endowment of Charles I, from which a handsome sum still accrues, the islanders have enjoyed numerous close scholarships, and formerly fellowships, at three Oxford colleges, Exeter, Jesus, and Pembroke, which have served as a ladder whereby many scholars have climbed to positions of distinction.

In the Middle Ages the islands exported large quantities of salted fish, the 'esperkerie', or drying on poles (perques), of conger and mackerel being regulated by the Crown. From the time when Sir Walter Raleigh (Governor of Jersey, 1600-3) fitted out a ship in Jersey for the Newfoundland fisheries, this industry took a new turn, and the Jersey fish-trade with Newfoundland, together with the ship-building therewith connected, has only recently ceased owing to incapacity on the part of small capitalists to tide over the transition from sails to steam. This sea-craft of the islanders was also of avail for purposes of privateering during the French wars, not to speak of smuggling. In the seventeenth century, and up to the time of the industrial revolution, the knitting of woollens (whence the application of the names 'jersey'

Lan-
guage and
educa-
tion.

Econo-
mic con-
ditions.

and 'guernsey' to certain types of garment) employed large numbers of both sexes, but, though fed with raw material by order of the Crown, this form of employment was not favoured by the States of the island, which, perhaps rightly (*pace* Le Quesne), ranked manly pursuits above mercenary gains. At present agriculture absorbs the energies of the population, the immemorial system of small holdings encouraging a sturdy and successful race of yeomen; while, of course, the mild climate assists, enabling a second and sometimes a third crop to be raised annually. The staple product is the potato, the value of the crop fluctuating from about £300,000 to £500,000 and averaging a little above £400,000. There is also a considerable trade in apples, pears, roots, vegetables, bulbs, flowers, and so forth, the output being of late fairly uniform except in the case of the open-air tomato culture, which is rapidly developing. Again, the raising of cattle, thanks to the strict exclusion of foreign strains, is highly profitable, and results in the export of not far short of 2,000 head a year. As for mineral products, these, except for a vein of china stone, amount to very little, the granite trade having of late years declined almost to nothing, though some gravel is exported, mostly in the form of ballast. It must be added that the large number of visitors attracted from both sides of the Channel by the amenities of the islands as both winter and summer resorts, forms a source of additional gain to the islanders. Taken together, these resources prove sufficient for a population whose tastes are old-fashioned, leaning mainly towards the simple and substantial, as the style of their solid dwelling-houses is in itself enough to show. Recent figures for Jersey (Parochial Assessments, 1912) place the total value of the realty at £7,318,340, and of the personalty at £2,288,720, the latter amount, it may be conjectured, being well inside the mark. Little poverty is to be found, at least among genuine natives, and social problems of the modern type hardly exist. Altogether, there is probably no more contented portion of the British dominions than this.

Guernsey and the Adjacent Islands

BY PROFESSOR H. J. FLEURE

The physical history of the islands has been treated in Physical geo-graphy. detail above, and as the facts about Guernsey are somewhat similar to those about Jersey there is no need to say more than that Guernsey and Sark have been cut off from Le Cotentin for a much longer period than has Jersey, and the intervening sea is much more exposed. Between them are the outstanding islets called Herm and Jethou and many rock-reefs of all dimensions. Against these islets and rock-reefs have grown many beaches of drifted sand and shells, and the most famous of them is the great shell beach at the north end of the east coast of Herm. The northern boundary of the Channel Islands is a prominent line westward from Cap la Hague, and on it stand out Alderney and the Ortac and Casquets Rocks, the shallow sea-channel between Alderney and Cap la Hague being the notorious tide-race Le Raz Blanchart, nine miles wide.

Guernsey, with its 24·5 square miles, is the chief island of the northern section of the group, and the differences just noted between its situation and that of Jersey have brought with them many contrasts in the life of the islands. In many ways Jersey is an adjunct of the continent, whereas Guernsey is primarily a haven of the sea. Yet, in other ways, the fear of French domination has made Jersey more anxious to emphasize English relationships, especially in unessentials, while Guernsey is probably more individualized.

Sark and the south side of Guernsey are gems of beauty, with coves of bright warm sand nestling beneath the steep cliffs, some of which are precipitous enough to protect nurseries of the sea-birds. The southern ridge of Guernsey runs east and west at a height of about 300 feet above the sea, and steep narrow ravines with water-lanes lead southward to the shore. From this high ridge the island slopes northward and it has roughly the form of a triangle.

Its west coast is low, reef-studded, and very difficult of approach, and the promontories and islets are centres of local legend and of immemorial sanctity, continued down into the Middle Ages in the case of the priory of Notre-Dame-de-Lihou. All along this coast storm-beaches have been built up and have banked in the drainage of the low-lying coastal belt, converting it into partially salt marshes. The north end was once an island with a rocky nucleus and a stretch of sand-hills, but it has been artificially joined to Guernsey save at the two ends, which are now therefore inlets. The west and north coasts are so reef-strewn and exposed that they are of little use for boats, and the harbours have therefore grown on the more sheltered eastern side. That of St. Sampsons occupies the inlet just mentioned; the other, St. Peter Port, has been built around a creek at the outfall of what was in its natural condition a considerable brook. St. Peter Port harbour was more centrally situated than that of St. Sampsons; its shelter was more complete, because a great detached rock-mass, crowned later by Castle Cornet, stood out to sea beyond its roadstead; there was a better supply of fresh water and of water-power for mills, and high land for refuge and defence was near at hand.

Pre-historic remains.

The islands are, or were, full of prehistoric remains, though the Jersey discoveries relating to the Palaeolithic period have so far not been paralleled in the other islands. The dolmens and menhirs of the islands must have been legion, but many have been destroyed; they seem to show that the islands were of special religious importance and were then not far from the mainland, for it seems to be almost a rule that prehistoric sanctities were gathered on peninsulas and offshore islets. The monuments of Jersey, which probably was a peninsula at intervals in those days, were by far the most elaborate.

Early settlement.

Of Guernsey in Roman times practically nothing is known, but, after the withdrawal of the Roman power from Gaul, Breton influences seems to have predominated in the islands. Gaul, with the exception of Brittany, had probably been Romanized to a considerable extent and

its old language may have been reduced to a dialect mixed with debased Latin. Brittany, on the other hand, was receiving accessions of strength from Britain, and its Celtic language and tradition were being strengthened. Moreover the Celtic preachers were spreading from Ireland and Wales, and the Channel Islands offered them ideal places of retreat: St. Helier is traditionally connected with Jersey and St. Magloire with Sark.

As time went on no doubt the islands were harassed by Scandinavian and other rovers, and the stories of conflict between these invaders and the natives form the basis of many of the local folk-tales. It is well known that the rovers dominated Normandy and Le Cotentin much more completely than they were able to dominate Brittany, and we find in the next stage of history that the islands are once more under the influence of Le Cotentin with the family of Neel de St. Sauveur, Vicomte du Cotentin, in authority. As government evolved, we find Guernsey receiving more or less of the Norman feudalism, with some allowance for the special position of the Church, the great Abbey of Mont-St.-Michel having founded a priory of St.-Michel-du-Valle, which continued in Christian guise the special traditional sanctity of the islet of northern Guernsey. There were several manors in the island ruled by manor courts, and a royal court and court of chief pleas were organized. The royal court was under a bailiff, and in it sat twelve sworn men or *jurats* (*jurés justiciers*). To the chief pleas came the members of the royal court and also the lords of the manors and others. Numerous officials gathered around these institutions as time went on: a royal attorney, or *procureur du roi*, a registrar, or *greffier*, a sheriff, or *prévôt*, and so on; and an assembly on a French model, and called *Les États*, grew up. To this assembly were called the members of the royal court, the clergy, and other persons of public importance, the assembly being on a smaller basis when meeting for purposes of deliberation than when meeting for purposes of election. The origins of the local institutions are very little understood, though they were off-shoots of Norman Government.

feudalism. Their plan must have been still in a very fluid condition when they reached the islands, for the institutions of Jersey and Guernsey differ more in point of fact than might be gathered from a comparison of names and offices. They must have begun to develop fairly early, for by the time that the Plantagenets set afoot their inquiries 'de quo warranto', the islanders were able to maintain that their institutions dated back to time out of mind. The final decision, which would probably have been against the islanders, was by one means and another postponed until Edward III's reign. He found himself too busy with French adventures to attend to the islands and the inquiries dropped; since then the islanders have gone on in their own way, but perhaps the fear of interference has encouraged an intense conservatism which pervades their local government both in form and in fact. This conservatism is interestingly illustrated by the fact that the roll of the court of chief pleas, as still called at each assembly, includes the names of manors as they existed centuries ago; thus, the lands of alien priories were confiscated to the Crown in Henry V's reign, but the names of the Abbess of Caen, the Abbot of Blanchelande, &c., are still called, and the king's attorney answers the call.

The
governor-
ship.

In Plantagenet days a governor, or king's representative, apart from the local government, was established in the islands and after a time the office became a sinecure, usually given to some person of high rank who drew the royal revenues. More recently the governorship has been abolished, and there are now a lieutenant-governor of Jersey, and a lieutenant-governor of Guernsey, each having a fixed salary paid out of the royal revenue accruing from the islands. The lieutenant-governor is the king's representative and the local military commander, and he may attend and speak, but not vote, at meetings of the States.

Historical
importance
of
the islands

The permanent retention of the Channel Islands by the Anglo-Norman Crown after the loss of Normandy has been mentioned above; the reason for this retention is

important for an understanding of their circumstances and relations. In the Middle Ages ships were small and the mariner's compass was not yet in use, so that to sail out of sight of land was a considerable adventure, but coasting trade was, and long remained, of some importance for both England and France, partly because roads were bad. The wine trade between England and Gascony was specially important, and the most practicable ways across the English Channel were either across the Strait of Dover or from St. Catherine's Point (Isle of Wight) to Cap la Hague. The excellent roadstead of St. Peter Port, protected by Castle Cornet on its outstanding rock, became an important refuge and port of call for this trade and gave that town its mediaeval primacy in the Channel Islands. The trade was mainly in English hands and the English connexion was thus naturally maintained and emphasized.

to traders
and ship-
men.

The organization of the local defences has been varied several times, but the essential force has long been a militia. At present Jersey and Guernsey are required to provide a certain quota of men attaining a standard of efficiency satisfactory to the War Office. Guernsey's quota is 1,000, and it is found partly by voluntary recruiting, the terms of service being favourably modified for volunteers. The work includes evening drill, rifle practice, and an annual camp, and members of the local force have won a fair reputation in the rifle competitions at Bisley year after year. The fortifications are under the care of a garrison provided from the regular army. Until local self-government was finally established beyond dispute the islands seem to have been somewhat shaky in their loyalty to the English Crown—after the political severance of England and Normandy in John's reign. When the *Placita de Quo Warranto* were forgotten, however, the islands became intensely loyal, for the name of England has become the guarantee of their traditional rights and they have realized more and more that incorporation with France would have meant the loss of their cherished individuality. In recent times they, and especially

Defence.

Guernsey, have contributed men and officers to the army out of all proportion to the population, as was seen from the lists issued during the South African War.

Ecclesi-
astical
arrange-
ments.

In matters ecclesiastical the islands remained through the Middle Ages under the diocese of Coutances, and Coutances district and the islands may have been connected as regards other departments of activity as well. The English kings diminished the Norman influence to some extent when the lands belonging to the alien priories were confiscated in Henry V's reign, but the Reformation had come before the islands were finally placed under the diocese of Winchester.

The Norman connexion was thus in part an intellectual one, and at the Reformation the Calvinistic influence penetrated from France to Guernsey, so that when England became Protestant the form of religion introduced in Guernsey was the Presbyterian. Under these circumstances it is natural that, in the seventeenth century, the island sided with the Parliament, though a few of its old families and the garrison of Castle Cornet held out for the King. The castle surrendered to Blake's fleet in 1653, marching out with honours of war after nine years' resistance. The Presbyterian influence was much strengthened by the influx of Huguenot refugees throughout this period, and one of them, Sarafia, was a famous master of the college or grammar school which was founded under Elizabeth and bears her name. Several of the refugees settled at the north end of the island on what had been the land around St. Michael's Priory, and that district has still a characteristic dialect and other noticeable peculiarities.

At the Restoration the islanders were forced to accept the Act of Uniformity, but the Puritan spirit survived in the Anglican Church, especially as the ministers must needs speak French. In the eighteenth century, therefore, when Wesley preached in the islands, the people flocked to him, and the Wesleyan Methodist Church has long been very powerful, especially in Guernsey. The religious history of the islands thus illustrates the strange mixtures

of English and French influences which have affected the islands and have led to their being partially French in culture and yet ultra-English in sentiment.

The business of the islands has passed through many phases. Of old the inhabitants were doubtless fisher-farmers, and in the Middle Ages St. Peter Port was a roadstead for ships; the islands were, in fact, declared neutral by a Bull of Pope Sixtus IV in 1483. With the rise in the standard of living in England in and after Elizabeth's time the islands seem to have been left rather poor, and arrangements were made for supplying them regularly with wool from England so that they might supplement their meagre earnings by knitting stockings, guernseys, and jerseys. From the time of William III onwards the islands' prosperity increased through the more or less continuous wars with France, for Guernsey fitted out privateers and went in for adventure of all kinds, profiting no doubt by the fact that the natives could pass as French in case of need. Jersey had not such a good roadstead and was not so much drawn to wild adventure; it gradually entered into, and gained large profits from, the Newfoundland fish-trade, carrying cod later on to Wellington's army in the Peninsula. Jersey thus became industrious and prosperous, while Guernsey amassed wealth in haphazard fashion. Meanwhile, it was found that the climate of the islands was suitable for maturing spirits and tobacco, and numerous vaults were built near the harbour of St. Peter Port for this trade; they still form a highly characteristic feature of the old town, though they have now become stores for coal and other bulky goods.

Economic
condi-
tions.

After the peace of 1815, Guernsey was faced with the stoppage of its privateering adventures, and soon the English merchants began to control conditions for maturing spirit and Guernsey lost this factor of its importance as well. But the spirit of adventure was strong and the Guernsey seamen continued to build and sail ships, doing traffic with distant ports. The stay-at-homes meanwhile cultivated potatoes, but a little later on disaster was

again threatened because of potato disease first of all, and later because of the introduction of iron ships and steamers, which Guernsey could not build. Guernsey, however, had by this time much accumulated capital and a large sum was wisely expended on the building of a great harbour with two breakwaters enclosing 72 acres of water. The harbour of St. Sampsons was also improved.

Agriculture :
trade in
early
market
produce.

Farming has usually been the mainstay of the island and the persistence of feudal custom has had useful results, for land is usually owned subject only to certain dues which have generally remained near their old levels in spite of changes in the value of money. The farms are quite small and farmers until recently co-operated for ploughing and other purposes, using a plough which made a furrow 12 inches deep and 18 to 24 inches wide. For centuries the land, at all events that near the coast, has been manured with seaweed cut during seaweed harvests carefully regulated by law. Through this intensive treatment, the land, originally indifferent in quality as being land over hard igneous rock, has become fertile and has allowed the Guernsey farmer to reap the benefit of the climate with its 1,922 hours' average annual sunshine as compared with 1,700 to 1,800 for some of the sunniest spots in England. Since fast steamers have been built for goods traffic the local farmer has developed an important trade in all kinds of early produce, mostly now grown under glass, often in artificially-heated houses. The tomato is the chief product, but grapes, melons, peaches, roses, chrysanthemums, and various vegetables are also grown. Daffodils are much grown in the fields and there are also numerous special nurseries. The export of produce often exceeds 50,000 packages per day. Guernsey and Jersey have profited by their isolation to develop and improve breeds of cows ; the two entirely separate breeds bear the names of the two chief islands, the old Alderney breed having now been merged with that of Guernsey. No cows of other breeds may land on any island save for slaughter, and no local cow which has left the islands is allowed to come back alive. The rich milk given by the cows makes

them valuable for export, especially to dairying countries, and the trade in them is considerable, though naturally fluctuating.

The hard compact crystalline rocks of the north of Guernsey are valuable for building purposes, for paving setts and for road-metal; there is a large export trade from St. Sampsons harbour.

Having specialized to such a degree, Guernsey must import some of the common necessities, and much market produce comes from the neighbouring French ports. Flour and corn are also brought in, as are straw, meat, and most manufactured goods. Anthracite, especially for heating the glass-houses, is an important item of trade. Guernsey is thus more in the realm of the sea than ever before, and its old connexion with France is now limited to the reception of market produce, horses, and labourers, and to a link with the Law School at Caen.

With so much business the population of Guernsey has increased very rapidly, both of itself and through immigration, till in 1911 there were 41,854 people on the 24.5 square miles, or 1,708 per square mile. The town of St. Peter Port has rather under half the population, while the north end of the island has something less than a quarter. The quieter, more old-fashioned southern district is somewhat less densely populated.

Sark remains more or less in the condition in which Sark. Guernsey was till its trade developed. It lives chiefly by old-fashioned farming and some fishing, but largely also by catering for visitors who come in search of a quiet retreat. It owes its present organization to a strange transaction of Elizabeth's reign whereby the island was granted as a manor to Helier de Carteret, Seigneur of St. Ouen, who divided it into a demesne and 40 tenancies in feudal fashion. A tenancy is heritable and saleable as a whole, subject to certain dues and restrictions, so the tenants are practically owners, but may not sell a part of their land. Any kinsman within certain limits also has the right to buy back at purchase price within a year and a day a farm which has been sold out of the family. The

forty tenants all attend a court of chief pleas to regulate their own affairs, and the seneschal of the lord of the manor presides over this court and judges minor offences. The Royal Court of Guernsey has enforced a claim to decide larger matters.

Alderney,
Herm,
Jethou.

Alderney has a small royal court of its own, with somewhat more independence of Guernsey than is found in Sark. Some farming and quarrying are done on the island, but some time ago the people were mainly dependent upon the garrison and the government works. A great deal of money was spent about fifty years ago in fortifying the place as a harbour of refuge near the French coast. The garrison is now small and the fortifications are not kept in repair, so that the island has fallen upon evil times.

Herm was once a deer park for the governor of Guernsey, who lived at Castle Cornet, but both it and Jethou are now privately rented.

Govern-
ment and
finance.

The islands are unique in their relationship to the British Empire. Parliament is theoretically without any authority over the islands, and no laws emanating from it can be enforced in the islands till passed by the States. The local government settles all taxation and makes its own laws, and the local court judges all questions with full authority, but the King's Procureur (or Attorney) and an assistant, who has taken over the old title of Comptroller, sit in both bodies and give advice. There is also an appeal in civil and legislative matters to the King in Council, and such appeals are decided by a special committee of the Privy Council. The King's revenues, largely feudal dues, are collected through a special office, and the salary of the lieutenant-governor and other items are paid out of them. The Imperial government maintains the garrison and the fortifications and the local government finds the expenses of the militia force.

The local government and the local banks have made successful issues of bank-notes, and loans have been issued locally to pay for public works such as the great harbour. It is an indication of local wealth and management that

the price of the loans was for a long time par together with accrued interest, and the interest three per cent. The loans are almost completely in local hands, and that which was raised to build the harbour has been entirely repaid.

There are no records of values of the islands' export trade, but conservative estimates make the total value considerably above £500,000 for an average year.

At the present time emigration is proceeding on a large scale, as Guernsey is rather over-populated, but its trade and prosperity remain remarkable nevertheless. Sark and Alderney would be feeling a relative impoverishment due to the general rise of prices elsewhere were it not that the ill-effects are being partly mitigated by increased gains from tourists. Alderney is also profiting by increased export trade in cattle and stone.

The chief communications are with Weymouth and Southampton by express mail steamer daily, but there are regular connexions with Plymouth, Poole, and the port of London, as also with Cherbourg and St. Malo. The steamers to France are small and are mainly market boats. The regular language is now English, but the old Norman dialect survives among the country-folk, of course much mixed with English words. The courts and the States (*Les États*) still use the French language and retain many archaic expressions from the old Norman, and the law is still based upon that of Normandy to such an extent that local lawyers go to study at Caen. A remarkable local custom provides for the registration of all transactions in land, whether purchases or mortgages, at the public record office of *greffe*. Many mortgages and dues are still payable in kind, whether in quarters of wheat, or in pairs of fowls, or in quantities of eggs.

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CHAPTER XX

THE ISLE OF MAN

BY G. W. LAMPLUGH

THE physical situation of the Isle of Man with respect to its larger neighbours is faithfully reflected in its present political relations; it 'is not parcel of the realm, but of the possessions of the Crown of Great Britain'. As a separate hill mass it rises boldly out of the Irish Sea midway between the shores of England and Ireland, and has possessed and maintained its identity as a separate physiographical unit from an early geological period. Hence it deserves the attention of every student of physiography as a miniature yet self-contained illustration of the shaping out of a hilly land by the various agencies of denudation. It owes its present shape directly to the erosive attack of the sea upon its margin and of the land drainage descending radially from its central hills, but the ice-sheets of the Glacial Period have also had an important share in its shaping.

Topo-
graphy.

The island is irregularly oblong, with its longer axis, dependent upon that of its rocky structure, striking N.N.E. to S.S.W., in which direction the land has a length



PLATE XXXI. MOULIN HUET BAY, GUERNSEY
(Phot. W. M. Spooner)



PLATE XXXVII. GLEN ALDYN. ISLE OF MAN

(Phot. Valentine & Sons)

of 30 miles, while its breadth, in the wider central portion, ranges between 8 and 12 miles. Its area, including the detached islet of the Calf close to the south-western extremity, is 227 square miles, of which about one-third, chiefly hilly moorland, is uncultivated. Its northernmost point is 16 miles distant from the nearest headland of the Scottish coast; its closest approach to the Cumberland shore is 31 miles; to that of Ireland, in Co. Down, 31 miles; and to the Welsh coast near Holyhead, 45 miles. In very clear weather it is possible from its highest hill-top to see at the same time the distant mountains of all these lands; but the more usual condition is expressed in its old legend of a wizard-chief who by his spells rendered the island invisible to its enemies.

Except at the northern end, where there is a tract of Hills and low and comparatively level ground having an area of glens. 45 square miles, and in the south-east, where the land slopes gradually to the sea, the island is everywhere, on a small scale, mountainous, with deep rocky glens of high gradient breaking up the hill-mass into ridges. The drainage is thus distributed into many streams, flowing north, south, east, and west, mostly with independent courses to the sea; and none is of more than local consequence. The Sulby, the Dhoo, and the Silverburn are among the larger. The hill-mass is broken through at its broadest part by a valley which runs from the east coast at Douglas to the west coast at Peel and provides the only easy route across the interior of the island. There is a low watershed midway in this valley, at about 160 feet above sea-level; and the gap itself appears to have been formed by the destruction of a narrow spur originally separating the glens of the east-flowing and the west-flowing streams.

The higher summits of the island are arranged along Elevation. a broad ridge which runs unbrokenly, save for the central gap, from the north-east coast near Ramsey to the south-west coast north of Bradda Head. North Barrule, near the northern end of this ridge, has a height of 1,840 feet; Snaefell, the highest of the hills, $3\frac{1}{2}$ miles further south,

has 2,034 feet; Beinn-y-Phott or Pen-y-Pot 1,772 feet, and Garraghan about 1,600 feet; while, south of the central valley, South Barrule has 1,585 feet, and Cronk ny Arrey Lhaa, precipitously overhanging the western coast, 1,449 feet. Though steep, these hills are smooth and rounded, not showing much bare crag, and mostly clad with a close growth of dwarf-gorse and heather to the crests. It is only in the deeper glens and on the magnificently rugged coast that the rocky framework of the island is really well exposed.

Popula-
tion: dis-
tribution
and
towns.

In consequence of the physical features, the population, dependent largely in the past upon the sea for its support, is clustered mainly along the coast, where all the old-established towns are placed. Castletown, in the south, was formerly the seat of government, with Peel on the west, and Ramsey in the north, subsidiary to it. But during the last century the growth of Douglas, from its central position on the east coast and from its superiority as a port of entry, has carried it far ahead of the others and has established it as the capital town for all purposes. The population of the island at the census of 1911 was 52,034, Douglas then having 21,101 inhabitants; Ramsey, 4,216; Peel, 2,590; Castletown, 1,817; the mining village of Laxey, about 1,100; and Foxdale, about 340.

Geological
structure.

The existence of the island as such is explained by its geology. Its hill-mass constitutes a much crumpled boss or knob of very old slaty rocks rising above the greatly denuded surrounding belts of newer strata which are now for the most part submerged by the Irish Sea. The old rocks, known as the Manx Slate Series, consist of clay-slates, quartzose grits and flaggy greywackes, accumulated as marine sediments at a period which, owing to the dearth of fossils, it is impossible to fix with certainty. We can be sure, however, that these rocks are not newer than Ordovician and more probably are of Cambrian age. After their deposition they were folded and crushed so forcibly by earth-movements that in some places the more brittle rock-bands were broken into fragments and distributed among the softer slates, producing when

re-welded the type of rock known as 'crush conglomerate'. The axis of the complex folds resulting from these movements is the axis of the present island, because the different belts of implicated rock are unequal in their resistance to weathering agencies, so that the most enduring (in this case, the tough close-textured slates and not the more splintery grits) now form the higher ridges. Toward the close of this early period of severe folding the rock-mass was permeated by innumerable veins (dykes and sills) of molten material from internal igneous reservoirs, and in a few places the molten magma formed larger intrusive bodies which solidified into massive crystalline rock. The two principal masses of this kind are the Dhoon granite, close to the north-east coast, and the Foxdale granite, midway to the south of the central valley, each with an outcrop of half a square mile.

Long before Carboniferous times the Manx Slates had been brought to their present condition in regard to structure, folding, and mineral condition; and they had also been planed down very extensively by erosion. This is proved by the relations of a shingly beach-deposit of Lower Carboniferous age to the slates on which it rests. The old beach in question forms a conglomerate underlying a tract of Carboniferous limestone 7 or 8 square miles in extent, which forms the lower ground around Castletown in the south of the island. By an interesting coincidence it happens that at the southern end of the promontory of Langness the position of this Carboniferous shore for a short space lies exactly along the present shore, so that the old conglomerate is broken up by the waves and is rolled once more as shingle over the same tidal flat as of yore, and the little reefs and gullies worn from the steeply inclined slates of this platform by the Carboniferous sea are disinterred, and, after an immeasurable lapse of ages, are swept by the tides again. It is very probable that the slaty hill-mass as a whole formed an island rising out of the early Carboniferous sea, though afterwards it was no doubt buried beneath later sediments now wholly removed.

On the low coast to the west of Castletown, a narrow strip of old volcanic tuffs and lavas is exposed, which from their association with the limestone are shown to be the product of a small volcano in the Carboniferous sea. These rocks are too limited in area to produce any marked effect upon the topography, except that they give rise to a charming and characteristic type of coast-scenery.

On the western flank of the island, in the neighbourhood of Peel, another small patch of rocks newer than the slates is wedged in between them by faults. This patch, covering less than a square mile, consists of red sandstones and conglomerates, probably either of Lower Carboniferous or of Devonian age, though sometimes assigned to the Permian. Like the Carboniferous of the south, these rocks dip away seaward, and are a fragment from the off-shore girdle of late Palaeozoic strata which appears to encircle the island. Further proof of the existence of this girdle has been obtained in the extreme north of the island by deep borings through the superficial accumulations of Glacial drift presently to be described. These borings, made in the hope of finding coal, reached the solid rock-floor at depths varying from 160 feet to about 400 feet below present sea-level, and proved the presence of Lower Carboniferous limestones, shales and sandstones; Permian sandstones and breccia; and Triassic saliferous marl and sandstone; and although the hope of coal was disappointed, the salt deposits of the Trias have been commercially exploited. If it were not for the drifts now heaped upon it, all this northern tract would, of course, be part of the Irish Sea.

The Triassic strata just mentioned are the newest solid rocks of the island, excepting a few small intrusive dykes of basalt of mid-Tertiary age, which fill crevices traversing the older formations in a general north-westerly direction, and most conspicuous on the southern coast.

Effects of
the
Glacial
Period.

After a long blank, the direct geological history of the island is resumed at the Glacial Period, which produced important modifications and has left a full record of them.

The relics of pre-glacial cliffs on many parts of the coast show that on the south, west, and east of the hill-mass the relations of land and sea at the beginning of the period were practically as at present. But on the north the island was then truncated by a bold coast, of which the shape is still clearly preserved, running due west from Ramsey. The 45 square miles of good agricultural low ground to the north of this pre-glacial coast is entirely the gift of the glaciers.

From the transport of drifted material and from the direction of the glacial striations on the highest ground, it is evident that during the culmination of the cold period an ice-sheet, occupying the surrounding basin rose higher than the summits of the island and swept transversely across them, depositing thick masses of boulder-clay in most of the sheltered glens and upland hollows. During the recession of this ice-sheet the hill-mass emerged as a *nunatak* and was notched by streams from the melting ice-fields in places impossible for present streams. In the north, the receding ice-margin threw out the heavy crescentic moraine of boulder-clay with fans of gravel, that raises the ground above present sea-level and forms the low Bride Hills, while the swampy hollow of the Curragh between these hills and the steep straight border of the mountains was then the site of an ice-dammed lake.

When the ice-sheets had vanished, the island probably stood for a time somewhat above its present level; but afterwards the sea fully reoccupied its basin and rose to 10 or 15 feet higher than it does now. The relics of this higher sea are seen in the broad barren tract of shingle forming the Point of Ayre, and in the narrow raised-beach platforms left in the recesses of some of the bays, such as those which afford sheltered sites at the water-edge for the nucleus of the ports of Douglas and Peel. Since this raised beach was left, the only geological change to be noted is the gradual reduction of land-area through erosion of the coast-line—a very slow process where the highly resistant Manx Slates form the bulwark,

but rapid in the northern tract where the cliffs are composed of incoherent drift. Peat has accumulated thickly in the hollow of the Curragh, and more thinly mantles many of the upland slopes and ridges.

Physiography.

The leading physical features of the land have already been dealt with incidentally. Owing to the combination in this little area of high ground and low ground—'strong' resistant rock and 'weak' yielding drifts; stream-guttering and sea-planing—almost every principle of physiographical development might be illustrated by small yet appropriate examples. But space will permit only of a few further notes on the subject.

There are traces, in the hill-mass, of an old cycle of erosion, probably of late-Tertiary date, during which a large portion of the slate-country was planed down to a nearly even surface or peneplane, leaving, however, some low residual hills. The remnants of this plain now occur at about 800 feet above sea-level, forming the smooth-topped even ridges between the deeply-trenched valleys. These newer valleys indicate a sharp rejuvenescence of the streams consequent upon a steepening of their gradients, presumably through an elevation of the old plain. The numerous picturesque glens thus formed, such as Sulby Glen, Glen Dhoo, and Glen Aldyn in the north, Glen Cornah and Laxey Glen in the east, and Glen Rushen in the west, constitute the most charming scenery in the interior of the island and contrast strongly with the smooth flowing outlines of the uplands from which they descend. These uplands afford rough pasturage for hardy breeds of sheep, and contain few human inhabitants; but the small farmer makes a home in the glens wherever the ground permits of cultivation.

The delightful coast-scenery deserves particular mention, as it is upon this feature that, by attracting annually a throng of summer visitors, the present prosperity of the island mainly depends. The drift plain of the north is everywhere fringed with broad tidal-flats of sand and shingle derived from the rapidly wasting cliffs, the range of the tides reaching a maximum of 21 feet between full

flow and ebb. But the open shores end abruptly where the Manx Slates come to the coast, and are replaced by jagged cliffs with pinnacled reefs and ledges at their base, for the most part inaccessible, but broken here and there by little recesses with beaches of shingle, known as Traies, by which the sea may be approached. Every small difference in the resistant value of the strata is picked out conspicuously in the slow wasting of these cliffs, so that all the contortions and other structures of the rocks are exhibited with diagrammatic clearness. It is interesting to note that the Scandinavian nomenclature for some of these features, dating from Viking times, is still extant; e.g. Ghaw (Icelandic, Gja), applied to narrow chasms breaking the cliff-line. On the east coast, among the boldest cliffs are those of Maughold Head, about 250 feet; Bulgham Bay, 600 feet; Clay Head, 300 feet; Douglas Head, 300 to 400 feet; and Spanish Head, 400 feet; while the west coast north of Bradda Head has altitudes of over 600 feet for several miles with little interruption, and culminates at about 1,400 feet in the rudely terraced precipices of Cronk ny Arrey Lhaa.

The climate of the island is essentially similar to that of all the western maritime parts of the United Kingdom. The inflowing Atlantic waters render the summers decidedly less hot and the winters decidedly less cold than in the inland and eastern parts of Britain; but the height and exposed situation tend frequently to concentrate the air-currents into strong local winds. From the same causes, the precipitation, mostly as rain and only occasionally as snow, shows great variation from place to place, ranging from about 25 inches per annum at the Calf and at the Point of Ayre to about 60 inches in the vicinity of Snaefell. The annual mean temperature is 49° F., while that of January, the coldest month, is 41·4°, and of August, the warmest month, 58·5°. The sunshine recorded at Douglas is stated to exceed that of any other portion of the kingdom except Devonshire and the Channel Islands.

Vegeta-
tion and
animal
life.

The flora and fauna of the island do not include any novel forms, and are characterized only by their paucity as compared with those of Britain. Thus, the list of recorded plants contains only about 450 species; and of land mammals 12 species, of which at least 5 appear to have been introduced by human agency^f. Of birds about 150 species have been enumerated; and of fresh-water fish 8 species, of which 4 or 5 can live also in the sea. This poverty of species is held to imply that there has been little or no land connexion across the sea-basin since Glacial times. Only in the marine life of its shores is the island naturally rich. Of extinct mammals, it is only necessary to mention the gigantic Irish Elk, whose bones have been found in considerable numbers in some of the lowland bogs.

Until the early quarter of the nineteenth century, agriculture was in a backward state as compared with that of England, farming and fishing being very generally carried on in combination. But on all the lowland country, with soils varying from stiff clay to light gravel, sand and peat, cultivation is now brought up to the average British standard, with a similar range and rotation of crops.

The absence of trees was a matter of particular comment by writers of the sixteenth and seventeenth centuries, though the presence of forests in prehistoric times is proved by the abundance of tree-trunks preserved in the peat-deposits. During the past century planting has been carried out widely, and with fair success in the valleys, but with less advantage in exposed situations, where the strong winds are an adverse factor.

Economic
condi-
tions.

The chief resources of the native Manx from early times have been derived from agriculture and sea-fishery, while, during the eighteenth century, when the island had a separate excise and customs, much profit was derived from smuggling to the mainlands; and in the nineteenth century metalliferous mining, which had been carried on desultorily from the beginning of historical times, assumed great importance. The fishery and mining industries

have, of late, suffered great decline ; but, as already noted, agriculture flourishes, and during the last century a new source of prosperity has arisen in the popularity of the island as a holiday resort, and is now almost of paramount consequence.

As regards the fishery, the herring and the mackerel Fishery. are its chief objects, though numerous other sea-fish are caught in smaller quantity. The Manx fishing fleet does not confine its operations to home waters, but seeks and follows the shoals of migratory fish around the coast of Ireland. When flourishing, the industry found occupation for from 2,000 to 3,000 men and boys.

The metalliferous veins, affording the basis of the Mining and quarrying. mining industry, occur in the Manx Slates and carry ores of lead (containing some silver), zinc, copper, and haematite-iron, of which lead and zinc are the chief. The veins are found in all quarters of the hill-country, but have been mined with permanent profit at two places only, Foxdale and Laxey. The workings at these two places stood for many years in the first rank among British metalliferous mines ; during the period of their greatest yield the annual output of lead-ore (1884-97) ranged between 6,000 and 9,000 tons, and of zinc ore (1874-82) from 7,000 to nearly 12,000 tons.

The Manx Slates are much quarried in rough slabs for building-stone ; the Carboniferous Limestone of the south is worked for the same purpose, both rough and dressed, and is also burnt for lime ; while the red sandstone of Peel supplies a workable freestone.

There are no manufactures of more than local consequence ; and the few native enterprises of this kind have tended to decline under the competition of the mainlands.

The social conditions have been radically altered during Social conditions. the last century by the great influx of summer visitors, who come principally from the busy industrial centres of the north of England, but also from the Clyde and from Ireland. This movement has been accompanied by an immigration of traders and caterers of all kinds,

by which the insular individuality has been wellnigh swamped, in the towns at any rate, so that it is only in the remoter country districts that the racial habits and characteristics are now distinguishable. The average number of these annual visitants, as reckoned from the harbour-tolls for the years 1908-12, is stated to be over 496,000.

Trans-
port.

The chief port of entry for this stream of visitors is Douglas, between which place and Liverpool there is communication to and fro by steamship on every weekday throughout the year, with many additional sailings during the holiday season, when also there are regular passages by Fleetwood and Heysham and frequent ships to Glasgow, Belfast, Dublin, and other ports. Inland communication is effected by lines of light railway, from Douglas southward to Castletown and Port Erin, and westward to Peel along the central valley and thence northward round the hill-mass to Ramsey. There are, besides, electric tramways along the beautiful coast for a few miles southward from Douglas, and northward to Ramsey, with a mountain branch to the summit of Snaefell.

Early
settle-
ment.

To the student of political institutions the Isle of Man is of peculiar interest, from its extraordinary maintenance of semi-independence through a long chain of overlordships, and from the survival of antique forms of self-government to the present day.

Human occupation dates from Neolithic times, of which the traces, in the form of stone implements and tumuli, are numerous. The presence of chipped flints on and in the post-Glacial raised beach shows that the area was an island when this early race inhabited it. Bronze implements occur, but are rare.

At the dawn of historic times the people of the island were a Celtic race, possessed of a language allied to but distinct from Irish and Welsh. This language, lingering to modern days, was used freely in the country districts until after the early part of the nineteenth century, and is still just kept alive by conscious effort. It appears to

have remained a spoken language only until about the beginning of the seventeenth century, when a written translation of the Prayer Book was made and was followed at the end of the same century and later by certain printed devotional books. Its indigenous literature is confined to a few 'carvels' or ballads. Early intercourse with Ireland is evident from the style of the oldest ecclesiastical relics. The oldest engraved stones bear Ogham lettering, while others of later date are inscribed with Runic characters and with Scandinavian symbols.

There are shadowy indications of dominance by Irish and Scottish princes before the coming of the Scandinavian invaders toward the end of the eighth century. These vikings, at first merely marauders, made actual settlement and mastery during the ninth and tenth centuries, and impressed their forms of administration and self-government upon their conquest. When definite history begins, at the end of the eleventh century, the island was under the rule of semi-independent kings of Norwegian ancestry, their rule continuing, with some interruptions, till 1265, when the Scottish kings gained dominance for a time. Next, in 1290, the islanders sought the protection of the English Crown, by which local kings or governors were appointed, and after several changes lordship came, in this way, to be granted in 1406 to Sir John Stanley, remaining then in the hands of the Stanley family and their inheritors, the Derbys and the Athols, with a break during the Commonwealth, until 1765, when the British Government bought out the rights of the Duke of Athol in order to control the excessive smuggling. Since this 'revestment', the island has been administered by a lieutenant-governor appointed by the Crown, in conjunction with a council or miniature 'upper house', consisting of six or eight of the chief legal, civil, and ecclesiastical functionaries, and a House of Keys, or 'lower house', of twenty-four members, now elected by popular vote, representing the six sheadings, or old divisions dating from Norse times, and the principal towns. The Imperial Government retains absolute control

Political
condi-
tions and
govern-
ment.

of the customs, postal, military and marine services, but all other laws are framed by the home Parliament. Before new laws take effect, however, they must be promulgated, with many quaint formalities of ancient custom, at the annual Tynwald Court, a public open-air assemblage directly derivative from the Scandinavian 'Thing' or folk-gathering, held at St. John's, near the middle of the island. At this gathering the authoritative personages take their stand in prescribed order on an old terraced mound while the laws are read out in Manx and English.

Culture
and
religion.

Education and general culture has now been closely assimilated to that of Britain, and is of the standard current in the northern counties of England. The established Church is a branch of the English Church, and is administered as a separate bishopric known as that of 'Sodor (supposed to signify Southern Isles) and Man'. Nonconformity is also a strong religious force in the island.

Works of
reference. [See G. W. Lamplugh, *The Geology of the Isle of Man*; and on govern-
ment, &c., the works of A. W. Moore.]

CHAPTER XXI

GIBRALTAR

BY NORA E. MACMUNN

THE Rock of Gibraltar, a barren precipitous mass of limestone rising abruptly from the narrow strip of sand that connects it with the mainland of Spain, presents in itself no attractions beyond that of natural defensibility. The habitable space is very small, there is no land of any economic value, and it remains purely a military fortress, but a fortress of a first-class order. The Straits that divide Europe from Africa and give access to and egress from the Mediterranean are only about 10 miles wide, and to possess Gibraltar is to have a basis for a complete command of the Atlantic gateway. With a British fleet closing this, all the oceanic waters southwards and eastwards as far as the Japanese seas are practically free to Britain, for no naval power except France has coaling stations on the way that would enable her to challenge our movements or threaten our commerce. The German navy, right away in the North and Baltic Seas, can only venture out for half the distance provided for by its coal supply and then return; it has no resting-place. Gibraltar, then, is of supreme importance to Britain, of far greater value than Malta, for in war-time the Mediterranean route with its many dangers might not be used to reach the East, but rather the absolutely safe oceanic route round Africa.

The Rock itself is $2\frac{1}{2}$ miles long (Britain owning also a half-mile of the connecting lowland) and from $\frac{1}{4}$ to $\frac{3}{4}$ mile wide. The crest line is about 1,000 feet in height, the actual highest point, the Pan de Azucar, being 1,408 feet high. The north front is practically perpendicular, presenting an immense wall of rock towards Spain. The east is almost equally precipitous, rising sheer from the

Position
and
strategical
importance.

Physical
character.

sea, with no coastal plain; the Rock is quite inaccessible from this side. To the west, on the side of the bay, the land slopes rather more deliberately, in steps. There is first a steep fall from the crest to an intermediate terrace, which in its turn slopes rapidly down to a narrow strip of level land by the sea, at its widest only 220 yards across, the inhabited portion of the little peninsula. The

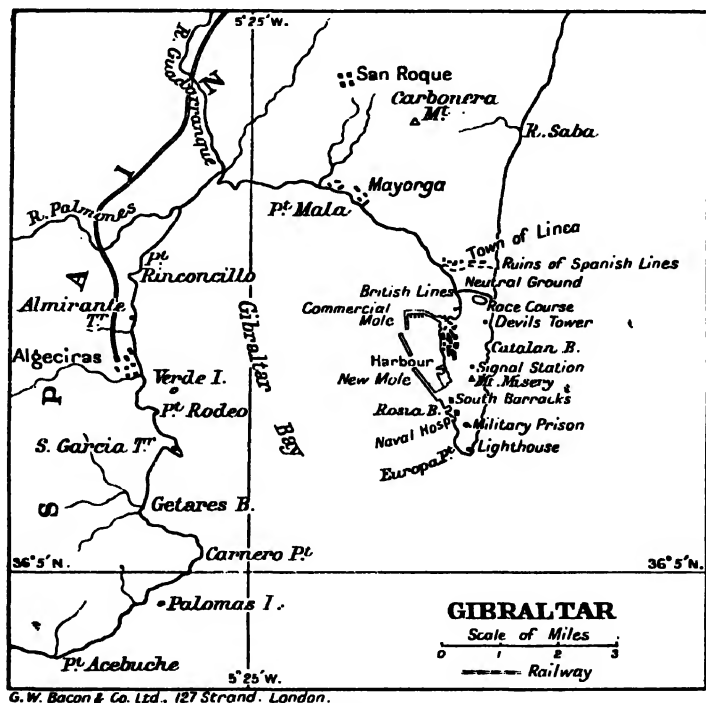


FIG. 61.

population is entirely on the west and south, with the exception of a tiny fishing community on the north-east side round Catalan Bay, where the cliffs recede very slightly, but the hamlet is accessible only from the north as the coast to the south is quite impassable.

At its southern end the Rock is less precipitous than in the north and falls to the coast in terraces. The highest is the Windmill Hill flats, about 400 feet above sea-level and a half-mile long, on to the west side of which

the houses have crept up from the town. This terrace drops again sharply to the Europa flats, 200 feet lower, also inhabited. These slope gently towards the sea to end abruptly in cliffs 50 feet high.

The Rock is formed of grey Jurassic limestone, very compact and sometimes crystalline. Its raised beaches give evidence of considerable movement in Tertiary times, and a passage to the Atlantic has probably been opened more than once. The present Straits date from Pliocene times. Large caves, some as much as 400 feet long, have been formed in the limestone with particularly fine and beautiful stalactites. Geology.

The climate, though of the true Mediterranean type, with a dry summer and marked winter rains, is yet modified by nearness to the Atlantic. The range of temperature is considerably less than that of Malta, removed from oceanic influences in the central Mediterranean, the difference lying chiefly in the greater coolness of the summer at Gibraltar. The average temperature of the hottest month (August) is 74.7° F., and of the coldest month (January) 54° , giving a range of 20.5° , while the range in Malta is 23.8° . The rainfall is, on the other hand, 12 inches a year more than in Malta. The Gibraltar average is 33.3 inches per annum, but the fall varies very much from year to year. In 1909 it amounted to 55 inches, and in 1910 to 24 inches only. This variability complicates the question of the water-supply of the town. In any case the summer is dry, June absolutely so, and July and August having only occasional thunderstorms giving a total of one inch or less for the two months. The spring and autumn fall varies considerably, but November to February are the wettest months. • Climate.

None of these physical and climatic conditions is very favourable to plant life. The steep slopes of Gibraltar allow of very little accumulation of surface soil, and the permeability of its limestone structure makes the country dry, while the absence of rainfall in the hot months shortens the growing season. In the early spring, a time of rapid growth after the rains of winter, the wild flowers Vegetation.

are numerous and beautiful, but the flowering is soon over, and the ground becomes dry and scorched. The level strip of land by the western shore is all taken up by the town and its suburbs, and there is no cultivation other than that of gardens in which the ordinary Mediterranean fruits are grown, but merely for ornament. Thus the Rock practically produces nothing, and there is no export trade except of an entrepôt character, the chief commodity being coal.

Water-
supply.

This coaling of passing steamers is the one important occupation of the colony beyond that of ministering to the needs of the town and garrison, and a considerable proportion of the civil population of 19,120 consists of coal labourers. The water-supply for this population, which the garrison and their families made up to nearly 25,000 in 1911 (a decrease since 1901), has to be collected in underground tanks, as wells are hardly practicable in such a region, though some water is obtained by pumping under the sands on the north side of the Rock. There are official bomb-proof storage works on the higher slopes, with a large collecting area, and with this a good supply is obtained.

The town
and popu-
lation.

The town itself is modern, the older city having been practically demolished by the great siege of 1779-83, though a few Moorish remains exist, notably of the old wall. But the Gibraltar erected on its ruins was only a poor, badly drained town, with miserable narrow streets crowded together, and much in need of the improvements begun in the latter half of the nineteenth century.

The population may be called modern also, the Spanish natives having left after the capture of the Rock by the British: The inhabitants other than British (the garrison and their families number about 6,000) are mainly of Italian descent, with a small proportion of Maltese, but the common language is still Spanish. There has never been anything in the precipitous promontory of Gibraltar to attract population, in fact it was in the past, rather a danger-spot to be avoided. We read of Ferdinand of Castile in the fourteenth century offering bribes of

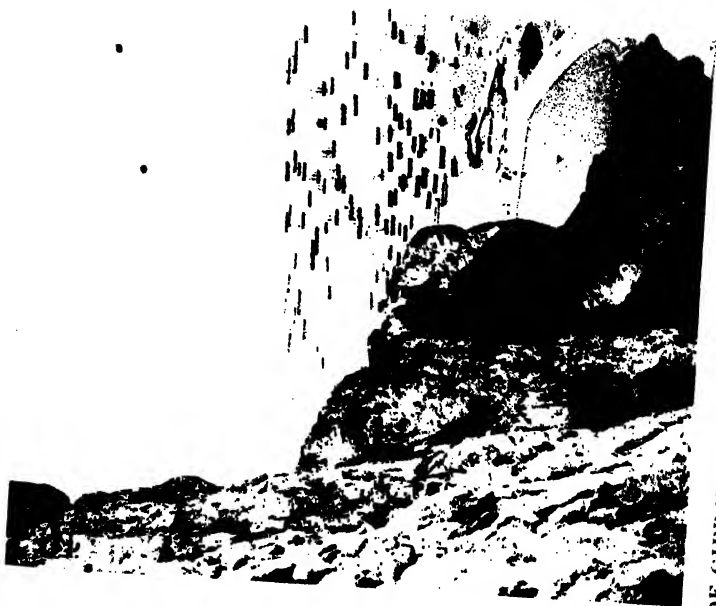


PLATE XXXIII. VIEWS OF GIBRALTAR
(Visual Instruction Committee)



PLATE XXXIV (a). VALLETTA, MALTA



PLATE XXXIV (b). CITTA VECCHIA, MALTA
(Visual Instruction Committee)

privileges that amounted to licence in order to induce Spaniards to go there. Its position entailed on it the fate of being constantly in dispute between the powers north and south of the Mediterranean separated from one another by such a narrow passage only. Its tale of sieges is long, for the only method of proceeding against such a strong position is by investiture.

Gibraltar was first fortified and used as a military base by the Moors in 711, in the course of their conquest of the Spanish Peninsula, and it was the last disputed position when the end of the prolonged struggle between Spaniard and Moor came. After being finally driven out of the mainland the Moors still endeavoured to retain hold of this outpost of Spain, so important in connexion with the control of the Mediterranean gateway. It took seven sieges, extending over a period of 150 years, after Ferdinand of Castile first retook Gibraltar in 1309, to settle the matter and crush Moorish power in the western Mediterranean and the Straits. In the sixteenth century Spain newly fortified the Rock, from which time it was considered impregnable till the British and Dutch combined dispelled this idea in 1704.

Early
fortifica-
tion and
develop-
ment of
the
station.

Since the beginning of the nineteenth century Gibraltar has had an undisturbed history, and as it has been a free port under British administration its position between two continents and two seas ought to have ensured the development of an important entrepôt trade. But it has not been so, partly perhaps on account of the bad economic administration of Spain, and partly also because of the political difficulties connected with the opening up of Morocco, and since the development of direct trade between the latter and the chief European countries Gibraltar has lost some of its earlier commerce. The only existing trade of importance is the coaling mentioned above. Gibraltar is a very important coaling station; nearly 2,000 steamers bunkered here in 1911.

This affords a permanent occupation for the colony, but there are often works on hand that supply temporary occupation, and this leads to administrative and Government, &c.

financial difficulties. For instance, at the end of the nineteenth century an enlargement of the dockyard and harbour was undertaken, an alteration that greatly increased the importance of Gibraltar as a naval base. This meant a temporary increase of population and the circulation of more money, the withdrawal of which on the completion of the work caused considerable commercial depression. Gibraltar, however, is administered entirely as a military fortress, and a civil working-class population is not encouraged. A great deal of the labour, especially the temporary labour, comes in by day from the Spanish town of La Linea on the other side of the neutral zone. The governor is always a soldier, and the government is autocratic, the only local authority being a sanitary commission holding considerable powers with regard to buildings in the town.

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CHAPTER XXII

MALTA

BY NORA E. MACMUNN

**Extent
and situa-
tion**

THE island of Malta has an area of 91 square miles, being 17 miles long and about 8 wide, but from its position in the central and narrowest part of the Mediterranean Sea it derives an importance out of all proportion to its size and resources. South of Italy, whose long peninsula divides the Mediterranean into a western and an eastern basin, the passage of the sea becomes very restricted. Sicily first closes half the gap between the mainland of Europe and Africa, leaving only a narrow strait of 2 miles between itself and Italy, while Malta rises near the

centre of the remaining space. It is not actually in the narrowest part (which is 80 miles across) but in a position to afford easy command of it, the most important strategic position between the Strait of Gibraltar and the Suez Canal, and about an equal distance from each. Besides



FIG. 62.

this, Malta provides a useful stepping-stone between Europe and Africa. It therefore lies at a very important cross-road, where the stream of sea communication from west to east, Europe to Asia, meets that from north to south, Europe to Africa.

The value of its strategic position has been the directing and controlling force in the development of Malta. The result of this strategic importance is seen in the very

varied and eventful nature of the history of the island, and in the many vicissitudes of Malta ; in the constant changes of control, showing an age-long competition for this rather unattractive little land, may be read the great significance of the position it occupies. The possession of a specially fine and well-protected harbour adds a further value to the island.

Round Malta are grouped several small islands, of which one is large enough to merit notice. This is Gozo, 3 miles to the north, a narrow island about 8 miles in length and 25 square miles in area, very similar to Malta in configuration and elevation. The tiny Comino, lying between the two larger islands, is used as a quarantine station, and the others are merely uninhabited rocks.

Structure
and
physical
features.

The Maltese islands are remnants of the broad low-lying land-mass that in middle Tertiary times occupied a considerable part of the area of the Mediterranean Sea, and whose subsidence was coincident with the upheaval of the mountain rim of the Mediterranean basin. They are formed of Tertiary rock with a little recent alluvium in some of the depressions, the formation being almost entirely limestone.

Malta is broadest, highest, and most compact in its southern and central portions, where it is from 7 to 8 miles wide. Towards the north it narrows considerably and is cut into on the east by long bays running some miles inland in a direction from north-east to south-west, the direction of most of the feature lines of the island. The longest bay, that of Melliha (2 miles), is only divided from the west coast by three-quarters of a mile of low country. The island, the main part of which consists of a compact plateau with a general slope from south-west to north-east, is, with the exception of the inner shores of the eastern bays, everywhere precipitous to the sea, though less so on the north and east than on the south and west. This configuration accounts for the rather remarkable fact that none of the high-roads reach the coast.

The land rising abruptly from the sea there is no coastal plain, but along the greater part of the west coast there is

a narrow terrace about a quarter of a mile wide above cliffs from 300 to 400 feet high, above which again the land rises rapidly to the top of the plateau on this side from 700 to 800 feet above sea-level. The east is considerably lower. This plateau ends abruptly towards the north, where the ground drops sharply, forming an escarpment running in the usual south-westerly to north-easterly direction right across the island.

Beyond the escarpment is a stretch of diversified country consisting of a series of narrow parallel depressions divided by belts of low rocky hills, the last falling to the north coast. These depressions are not due to denudation, but are the result of earth movements in the shape of faults. One great fault formed the escarpment on the plateau, letting down the whole of the northern part of the island and also the southern end of Gozo, where the corresponding great fault line is to be found, while a series of lesser faults formed the intermediate depressions.

The result is that the island consists of two distinct parts forming different natural regions; the higher more compact plateau of the south, broken into, however, by the famous double harbour of Valletta, and the northern district of alternate valley and low heights of from 300 to 400 feet. In all cases the slope from one level to another is steep, and rocky cliff-like edges abound; in fact gentle slopes are almost unknown in Malta. Such a configuration is to be expected in a country formed entirely of porous calcareous rocks lying in a nearly horizontal position. Subaerial denudation acting on such a surface is bound to produce steep slopes and sudden changes of level.

The drainage lines of the island run in a north-easterly direction with the tilt of the land. A few narrow canyon-like valleys have been deeply incised into the plateau, but owing to the porous character of the Tertiary limestone, added to the fact that the rainfall is seasonal, there are no permanent rivers. The waterless valleys of the south, mere rocky gorges, are of no use either economically or as routes, and are actually a hindrance to communication along the plateau. The tectonic valleys of the northern

region, though equally lacking in perennial streams, are much wider and are useful in facilitating movement from east to west. They furnish the alluvial areas of the island, the valley of the Wied il Ghasel, running from the foot of the escarpment to Salina Bay, containing the largest extent of clayey land in the country.

Climate.

A country formed of very porous rock is not conducive to luxuriant plant life, and in Malta climatic conditions are also unfavourable to natural vegetation, and hence the general bareness of the island so constantly insisted upon especially by its earlier visitors. The most important characteristic of the Mediterranean type of climate is the drought of summer, the combination of heat and dryness having a marked effect on plant growth. The months of June, July, and August are absolutely rainless in Malta. The spring and autumn months have a very variable rainfall, but the aggregate in these seasons is not great, for out of an average yearly precipitation of 21 inches, 13 fall in the four winter months November to February. The actual amount of rainfall in any given year is apt to vary very considerably from the average, and totals as low as 8 inches have been recorded.

The winters are cool, the average temperature for the three winter months taken together being 56° F. and for the coldest of them (February), 53·4° F. Snow falls in some winters, while frost is not unknown in the east. The summer heat is great, but not as a rule excessive. The average temperature in the hottest month (August) is 77° F., but a maximum of 105° F. has been recorded.

The strength of the winds is considerable and gales frequent, especially from the north-west and north-east, the latter being particularly strong and often dangerous to shipping. The most unpleasant wind, however, is the southerly Scirocco, which is not only hot but charged with moisture by the time it reaches Malta, and causes an all-pervading dampness that is both unpleasant and depressing.

Vegetation.

The high winds combine with the dryness of summer to promote evaporation, and the effect is seen in the large

proportion of annuals in the vegetation and in the xerophilous character of the perennials. The prickly pear is a characteristic tree, but trees, other than those cultivated for fruit, are very sparse, except in a few better-watered ravines on the south-west coast. The most widespread natural plant is perhaps the carob (or locust tree), a low-spreading shrub with very dark green foliage that grows in patches over most of the uncultivated land. The idea received of the island in 1530 by the commissioner sent to report on it for the Knights of St. John was that it was 'an arid rock with not one forest tree, hardly anything green to repose the eye upon', while for a writer on Malta in 1870 'burning white limestone and dusty roads' sufficiently conveyed the general impression of the landscape. But this bare and arid limestone can be, and is, made to produce good crops of the useful plants.

The main difficulties in the way of cultivation are the dryness of the soil, the absence of permanent surface water, and the steepness of the slopes, from which the soil is all washed away unless retained by special means. But what soil there is is productive. The insoluble residue of the limestone rock forms, under denudation, a clayey marl made very fertile by the large proportion of carbonate of lime, and though it furnishes only a thin covering it yields two to three crops a year and more under irrigation. As the rock is split and cracked by atmospheric agencies, the broken pieces constantly fall on the fields, so the soil is continually renewed by the leaching out of the lime from these fallen blocks and the fertility thus maintained by natural means. The soil has been carefully collected from the places where the level allowed it to accumulate, and spread over the fields on the rocky slopes, which were carefully terraced to prevent wash-outs, and cultivated in small walled enclosures—the stone offers no difficulty, as the limestone contains much good building-material. These walled terraces and fields are characteristic features of the landscape of Malta, as they are of south-east Spain and other dry and rocky Mediterranean lands.

where somewhat similar physical conditions have necessitated the same laborious method of cultivation.

Chief
crops.

The chief crops are wheat and barley, but root crops, especially potatoes and onions, are nearly as important and help to supply the early markets of the north. They head the short list of local exports. Corn is not exported, but forms a large item of the import trade, for the island does not come near supporting its dense population in food-stuffs. The harvest is early, in May or June. When the warm spring begins in March comes a rapid growing season after the rains of winter, and the maximum growth is reached by the end of April, after which the drought and heat shrivel up everything. The climate, with its rainless hot ripening season, is especially suited for fruits, and oranges, pomegranates, figs and vines are grown and exported, oranges being one of the more important sources of wealth in the island.

The short pasture of the dry soil is better suited for sheep and goats than for cows, and the former are largely kept and outnumber the cattle by three to one. Fodder crops are also grown, especially a fine clover with a brilliant purple red flower that adds colour to the landscape in spring, while the varied limestone flowering plants, which are particularly beautiful, lead to honey being an important product.

Minor
industrial
occupa-
tions.

The cultivated land, which in the first decade of the nineteenth century amounted to about seven-tenths of the whole area, is worked in small holdings of from three to four acres each. The people are mainly farmers, as there are practically no facilities for industrial developments. Cotton can be grown, and in the past, before its increased cultivation in Egypt, it was an important crop, and cotton goods were made. Though the cultivation decreased during the nineteenth century, some few cotton goods have continued to be exported and a little raw cotton. Lace is still largely made by the women and children, and filigree work forms the only other industrial occupation. Lastly, fishing occupies a section of the people, tunny, mackerel, and sardines being the chief fish caught.

The cultivable land in this densely populated island is so valuable that it is not to be wasted on houses, and the owner cultivators live away from their land in the villages, which are large and fairly numerous. One great problem in connexion with the distribution and density of the population of Malta lies in the difficulty experienced in obtaining water, a difficulty which always arises in a region of porous rock.

The Tertiary limestone of Malta is particularly porous, and this makes the existence of any surface water impossible, but it ensures a good underground supply, as there is the less opportunity for evaporation. The water, however, sinks through from 300 to 500 feet of limestone, and is not easy to reach except along a very narrow strip of country in the central part of the island. The limestone rocks that form the surface belong to two series separated by a thin bed of blue clay. The lower, the Globigerina limestone, is exposed over the south and east, but in the north and west the Upper Coralline still remains, and the dividing layer of clay thus preserved outcrops along a line running from St. Paul's Bay southwards to the west coast about 50° N. lat. at a level of 400 or 500 feet above the sea. It holds up and throws out the water absorbed by the Upper Coralline limestones.

Near this 'spring line' is the old capital of Malta, Città Vecchia (or Notabile), and from here water is taken in an aqueduct 8 miles long to the modern capital Valletta and the other towns round the Grand Harbour, while tunnels are run in at the surface level of the clay to collect water for irrigation. Away from this belt rain-water preserved in tanks had originally to be depended upon for the water-supply, but this is exceedingly uncertain in quantity owing to the variability of the rainfall, and drought meant disaster. Now, however, shafts have been sunk in several places through the upper limestone to the level of the clay and through the lower limestone to sea-level, and the underground water tapped by pumping. Thus an adequate supply for all purposes has been ensured.

Roads
and rail-
way.

Practically all the towns and villages are in the plateau region of the island, and the population is very unevenly distributed, being exceedingly dense in the south and very sparse in the north, thus emphasizing the natural division of the island into two parts. Only one regular village—Melliha—lies in the northern region beyond the fault escarpment, and to this the one good carriage-road of the district goes. A small fishing settlement on the shore of St. Paul's Bay, through which this road passes, has become something of a pleasure resort for visitors. Two indifferent roads and a few rough cart-tracks complete the means of communication in the north. The southern part is fairly well provided with first-class roads that are well kept near the villages, and a railway (opened in 1892) connects Valletta with Citta Vecchia.

Towns
and
villages.

There are 32 villages in Malta; the only towns besides the old capital, which has not more than 7,500 inhabitants, are those round the harbour, Valletta itself (32,000), a group of three towns on the southern side, and one on the northern, all of which have grown enormously since the British occupation.

Citta Vecchia is a walled town and of very great historic interest. Its foundation dates back to times beyond our certain knowledge, and it is described by the Romans as a fine town with many stately buildings. They themselves added much to the city both in public and private buildings, while they built in many other parts of the island as well. In earlier times the town was larger than now, but it was reduced by the Arab conquerors of the ninth century for greater safety and ease of defence. It is built entirely of stone, as are all the towns and villages, for stone is the one kind of building-material at hand, there being neither timber nor clay in sufficient quantity for bricks.

Valletta, though comparatively modern, is likewise of great interest owing to its unique position and its careful planning on a site not too easy to utilize. It was planned and built in the later part of the sixteenth century by La Vallette, the Grand Master of the Knights of St. John, soon after they came to the island. Before their arrival

there had been no town in the centre of the harbour, only a fort, St. Elmo, perched on the extreme end of Mount Scieerras, the ridge of land that runs out into the harbour dividing it into two arms nearly two miles in length. The ridge rises very abruptly from the sea and the steep slopes had to be terraced for building. The town, leaving out of account the very modern suburb of Floriana lying to the west of it, consists of four terraces on each slope and a street along the crest of the hill. These nine parallel streets are connected by twelve others transverse to them at regular intervals. They climb the steep slope in many cases by means of regular staircases, the 'streets of stairs' so often photographed as among the sights of Valletta. Not long after the town was finished, in 1610-15, the aqueduct was made that brings the water 8 miles from the springs of the clay belt. A similar aqueduct supplies the three towns south of the harbour, Vittoriosa, Isola, and Burmola, towns of 8,000 to 12,000 inhabitants. They occupy the small headlands that separate the lateral creeks opening to the main southern arm of the harbour. Only one of the similar headlands on the northern side is occupied by a town, that of Sliema. Vittoriosa is the oldest of these harbour towns, having existed before the arrival of the Knights, though not then of much importance. Valletta is a crowded, over-populated city accommodating 32,000 people on its narrow peninsula, of which 24,000 are within the confines of the old town. Its healthiness, however, has been very fair since its drainage and sanitary problems were taken in hand in the latter half of the nineteenth century by Sir Jasper le Marchand, at whose arrival the condition of the town was very bad indeed.

The population is mixed, as might be expected on an island standing in an important highway like the Mediterranean. Two of the most permanent factors in the whole political history of Europe are the struggles between the north and south of the Mediterranean, this especially in the early days, and between the east and west. Malta lies exactly in the central position, which involved it in all of these. It first came in the way of Phoenician

Popula-
tion and
history.

expansion, and many traces of their colonization are to be found. Some of the finest Phœnician remains are in Malta, and the Phœnician strain is predominant in the population to-day, in spite of the many nationalities that have entered since. The Greeks followed the Phœnicians, and Rome and Carthage in the grip of their great struggle for dominion in the Mediterranean swayed backwards and forwards across Malta, conquering and reconquering it. It remained finally to the Empire, but fell for a time to the eastern division in the fourth century, though its position seemed to give it far more to Rome than to Constantinople. This was realized by the later Norman conquerors of Sicily and southern Naples (the Two Sicilies) and their successors, who had no doubt that Malta ought to go with Sicily and took it. From the eleventh century, when it was wrested from the Arabs, who had acquired it in the ninth, it was held by the ruler of Sicily, whether he was Norman, Imperial, German, Angevin, or Aragonese.

A change came, however, in 1530, when Malta was granted to the Knights of St. John, with whom it is most commonly associated, when they were driven out of the eastern Mediterranean by the Turks. It thus became independent. Planted on this naturally defensible island, which they rapidly fortified, the Knights were able to make a more successful stand and stopped any further Turkish advance on Christendom. From this position, likewise, the Knights were able to patrol and control the narrow passage of the Mediterranean, and for a time no vessel was safe that did not possess their Mediterranean Pass, the memory of which is still preserved in the password of the Masonic Order of the Knights of Malta.

Strategic
importance
of
the
island.

All-important though Malta is in the Mediterranean, it acquired a still greater value when European dreams of great Imperial developments in India became practical politics. It is obvious that dominion in India makes command of a position that facilitates control over Egypt and the passage to the Red Sea imperative. Napoleon's eastern ambitions led him to seize Malta as a step on the way to

Egypt and the narrow neck of land that divides European and Indian waters. His failure, determined by the battle of the Nile (1801), gave Britain a chance that was not missed to acquire this valuable basis for influence in the Mediterranean, a position whence she could keep an eye on the Suez route, whether land or water. It also enabled Britain to impress her influence markedly on the Levantine situation, and its importance was illustrated by the use made of it in the Crimean War, when troops were landed on the island to be kept there till required at the seat of war.

The immediate strategic importance of Malta has however, waned slightly since the beginning of the twentieth century. The balance of political forces had changed, and with the rise of the German navy Britain has been led to concentrate her naval strength once more in home waters and reduce her Mediterranean fleet, depending on Gibraltar if need be to close that sea. Since the growth of continental naval power in the Inland Sea, the short sea route has ceased to be considered a war-time route to India. The absolute safety of the Cape route for Gibraltar in our hands obviates the danger of any attack on our fleet from the Mediterranean—more than compensates for the extra fortnight of time required to reach India.

The prosperity of Malta has thus for various reasons declined. It has passed its zenith with the perfection of steam-power and increase of mobility at sea. It is no longer a port of call to anything like the extent it used to be in sailing days; indeed its port is not suited to modern trading requirements and few attempts are made to adapt it. The real export trade of the island is very unimportant. Half the value quoted in the tables of export trade is made up by the coal previously imported to supply merchant vessels. The imports, which are nearly three times the value of the exports, are partly paid for by wages earned by working for the Government. A large proportion of the necessary food-supply has to be imported, and wheat and flour head the list, followed by alcohol. The local Economic condition.

produce sent out of the country is almost entirely agricultural, the most important being vegetables and fruits. Next, though far below, come cigars, hides, and cotton (raw and manufactured), almost equal in value, and well below again, fish.

The ques-
tion of
over-
popula-
tion.

The island is generally considered to be over-populated, and the Colonial Report for 1910-11 reports an outflow of population to the United States, the result of lack of employment at home. The total population in 1911 was, including Gozo, a little over 228,500, giving a density of about 1,950 persons to a square mile, the highest density to be found in Europe. The population of Malta is artificially increased by the presence of the British garrison, and the livelihood of a large number of people depends on this, and any withdrawal of the troops would mean much destitution, such as occurred when the French upset the power of the Knights. At that time the people had been living partly on the revenue of the Knights drawn from other European countries and independent of Malta itself. It seems, therefore, that the population has for a long time past outrun the number that the resources of the island can legitimately support, a result due to its geographical position that has given it a peculiar history and brought so many people there for strategic reasons.

Adminis-
tration :
the lan-
guage
question.

In earlier times the population has fluctuated very much owing to the frequent war troubles, and, as another result of the unrest its position entailed on Malta, poverty has been the persistent condition of the native inhabitants. We get glimpses of their miserable condition from time to time. For instance, on the arrival of the Knights we learn that the island was in a desolate state owing to the Turkish invasions, and many more people died of want in the terrible Turkish attacks made immediately afterwards. Again, in the early nineteenth century after the disturbances of Napoleon's times, the state of the people is described as very miserable and the poverty and ignorance great, and the cry of over-population was raised then. For this and many reasons the difficulties of administration have been considerable. The mixture

of languages has complicated the education question. Maltese is really only a spoken language, the written language before our occupation was Italian, and ever since popular education was established at all (about 1840), battle has raged round the question of which tongue is to be taught in the schools. It forms one of the stock subjects for agitators, combined with that of the language of the law courts. Further, the religious question in a country so long under priestly government adds another great difficulty, and for all these reasons the matter of a constitution for Malta has given trouble. Indeed, the attempt to combine the military administration of a fortress with a form of constitutional government is not a simple task. Malta being a Crown colony is administered by a governor, usually a soldier, but he is assisted by an executive and a legislative council. The executive is appointed by the Crown, and the majority of the legislative is elective on a rather restricted male franchise, entailing besides a small property qualification. The electors amount to about one-eighteenth only of the total population, but even this moderate attempt at a popular government has not been found to work very smoothly.

[See J. Murray, 'The Maltese Islands, with special reference to their Bibliogeological Structure,' in *Scottish Geog. Mag.* (vol. vi, 1890), and J. W. Gregory on the same subject in *Trans. Roy. Soc. Edinb.*, vol. xxxvi, 1892; G. Strickland, *Remarks and Correspondence on the Constitution of Malta* (1887); Debono, *Storia della Legislazione in Malta* (1897). Mr. J. Chamberlain dealt with the language question in the House of Commons, January 28, 1902, and constitutional and administrative questions may be studied in parliamentary papers: see also *Colonial Reports*, annually. The history and antiquities of Malta are the subjects of a fairly extensive bibliography; cf. *Encyclopædia Britannica*, 11th ed., vol. xvii, s.v.]

CHAPTER XXIII

CYPRUS

BY PROFESSOR J. L. MYRES

CYPRUS is an island in the Levant, lying between $34^{\circ} 33'$ and $35^{\circ} 41'$ N. and between $32^{\circ} 20'$ and $34^{\circ} 35'$ E., within sight of the coasts of Syria and Asia Minor. Its greatest length (from east to west) is about 141 miles, and its greatest width about 60 miles; but the long eastward promontory is less than 10 miles wide for an extent of nearly 50 miles; and the average width of the remainder of the island is not more than about 40 miles. The coast-line measures 486 miles, and the area about 3,584 miles. The island is thus rather smaller than Sicily and Sardinia, and rather larger than Crete.

Natural Conditions

Topo-
graphy
and
geology.

A large part of the surface consists of two ranges of mountains, running nearly east and west, and separated by a broad lowland. The long, narrow, and very abrupt ridge of the Kerynian mountains, which defines the north coast and forms the Karpas promontory, rises to 3,135 feet at Buffavento, but elsewhere rarely exceeds 2,000 feet. It consists of upturned cretaceous limestones, flanked by Eocene sands and marls, and gives the lowland fair shelter from the north wind. The loftier but less impressive highland of Troödos, which fills the south-western part of the island, has its highest peak at 6,406 feet near its western end, and three others over 4,000 feet further east. It consists of old crystalline rocks, locally rich in minerals, and throws out long spurs into the sea to the north-west, forming deep bays; another detached peak, Stavrovouni, of 2,260 feet, lies further to the east, within 12 miles of Larnaka. This highland region is enveloped

about its flanks in soft Oligocene and Pliocene marls and limestones, which form fertile rolling country along the west and south coasts about Limassol and Paphos; and also extend eastwards into the wide plateau which lies between the three chief towns, Larnaka, Famagusta, and Nicosia. Between these two uplands lies the broad depression of the Mesaoria, which drains from a low watershed some distance west of Nicosia, westward into

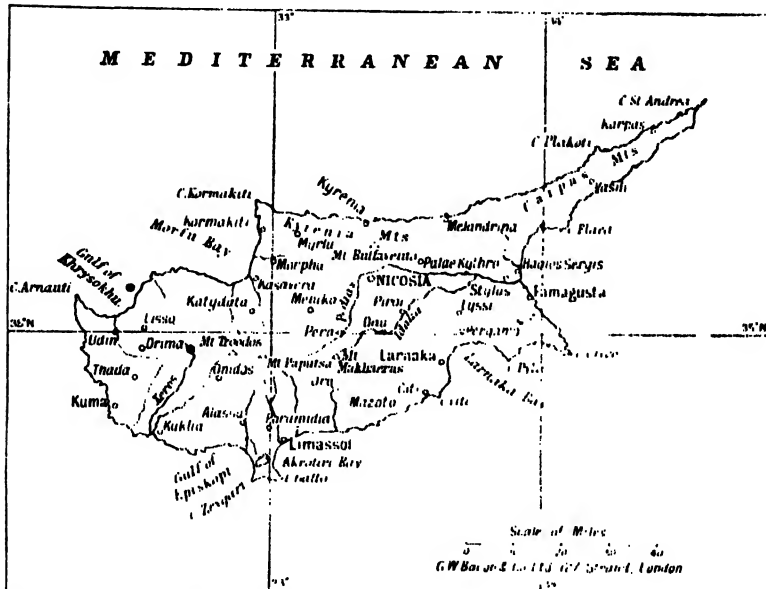


FIG. 63.

the Bay of Morfou, and eastward into that of Famagusta. Its length is about 60 miles, and its breadth from 10 to 20 miles. Most of its water-supply comes from the northern slopes of Troödos, but even the largest eastward streams, Pedias and Yalias, do not reach the sea in summer, though in winter they form extensive fens.

The climate is of the Mediterranean type. The mean annual temperature is about 69° F., with cool, wet winter from October to March (average minimum at Nicosia 31°), short brilliant spring, and hot rainless summer (average maximum at Nicosia 104.2°). In the

hill stations of Troödos, however, the summer day temperature is seldom over 80°, and the night temperature about 48°. The mean annual rainfall is about 19 inches for the whole island. But the rains come very irregularly, in small cyclonic disturbances from the west, and much water passes uselessly down steep torrent-beds into the sea or the marshes. Snow lies heavily on the peaks of Troödos in winter and spring, and can be preserved in hill stations throughout the summer. In marshy spots, and along stream-beds, malaria is common, and sometimes troublesome. The local disease known as *phalangari*, rare, but dreaded by the natives, is now regarded as an anthracoid infection conveyed by an ant-like insect.

Vegeta-
tion.

Before the vegetation was deranged by man's enterprises, Cyprus seems to have been densely forested to sea-level: only along the margins of the fens did a narrow belt of park-land permit the first pastoral and agricultural settlements. Throughout antiquity these forests were exploited ruthlessly, the principal timber-trees being pine, cypress, and cedar; oak, walnut, and Spanish chestnut also grew freely in the moister parts. But in mediæval and modern times irreparable damage has been done by reckless cutting for fuel, and by goat pasturage; though recent regulation of selected areas has had fair success. To the old forests succeed plantations of olive, carob, and vine, with mulberry, apricot, fig, and a few other fruit trees. But all these depend on the precarious rainfall, and large areas are abandoned to evergreen scrub vegetation of the regular Mediterranean type: bay, myrtle, mastic, ilex, with undergrowth of thyme, sage, and other aromatic and thorny shrubs. On the deeper soils corn crops do well if the winter rains are adequate, and if the late hailstorms spare them. Harvest begins in April, and is over by July. Flax has been grown since antiquity, and cotton recently. Oil and wine are copious, but of rough quality. Garden crops of vegetables and fruit succeed only with irrigation.

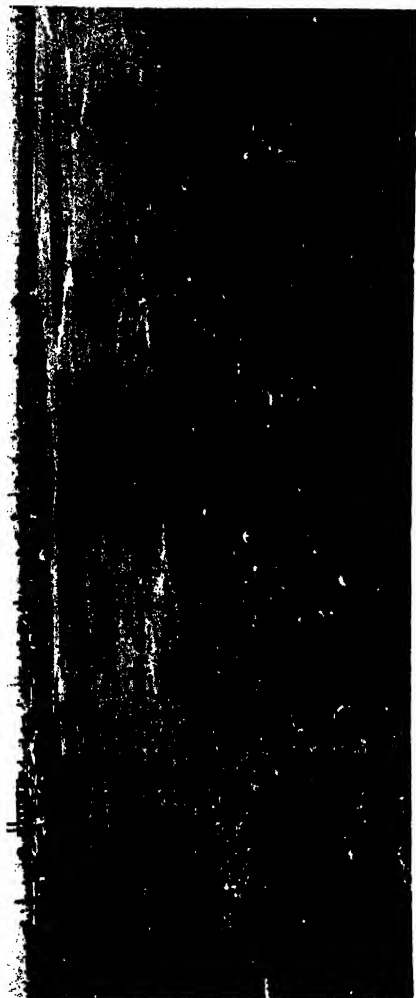


PLATE XXXV. NICOSIA, CYPRUS
(Visual Inspection Committee)



PLATE XXXVI (a). HILARION, FROM KERYNIA, CYPRUS



PLATE XXXVI (b). TEKKE OF HAKKA SULTAN, CYPRUS
(Visual Instruction Committee)

Economic Conditions

Though in antiquity Cyprus was celebrated for its ^{Agriculture.} mines and metal-working, and seemed an inexhaustible source of timber, and though in mediaeval times Famagusta was a great centre of oriental trade, in the modern world the changes in distribution of population and industry, and the discovery of fresh routes to the East, have combined with long misgovernment (of which they were themselves in part the cause) to transform it into an almost wholly agricultural country. The ancient forests, mismanaged by their owners, and devastated by fires and goats, were almost gone when the British administration set about to restore them. The cultivated land is now estimated at 1,200,000 acres, about half the total area; but of the remainder 320,000 acres are reported 'susceptible of cultivation', and no less than 450,000 acres are reserved as forests, which, if the present efficient forest service is maintained, should be of large ultimate utility. The greater part of the cultivated land is farmed by its peasant owners, and large estates are rare; but leaseholds are common, and also *métayer* partnerships, in which one man supplies the land, or the seed, or trees, and another the labour, and they divide the produce in agreed shares. The government takes a tithe of all wheat, barley, oats, and vetches, which is measured at the threshing-floor, and delivered in kind at the government granaries: carobs pay tithe in money at a fixed rate on the weight at the time of export. The tenure of land (*Arazi*) and of other immovable property (*Mulk*) is still essentially that which grew up after the Turkish conquest. A new survey and registration of all such property has been begun under a law of 1907, which will simplify the work of the Land Registry Department. Though the Agricultural Department does much to introduce improved methods, and conducts experimental stations, most of the cultivation is still of primitive simplicity. The crops are of two main classes, sown crops and the produce of trees. In the sown fields the wooden

ox-drawn plough and a broad mattock are almost the only implements : weeding and cleaning are omitted, reaping is done by hand, and threshing on open floors of beaten earth, on which the grain is trodden out by animals and rude sledges, and winnowed in the breeze. In the total absence of hay, the straw and chaff are the chief food of the beasts of burden. Winter crops, such as wheat, oats, barley, flax, and beans, are sown about October ; spring crops like vetch and aniseed in January and February ; and the summer crops, cotton, sesame, maize, and millet, in April and May. Biennial rotation allows of a brief interval for fallow and grazing between a winter and a spring or summer crop.

Chief
products.

The principal grain is barley, of which the Cyprus crop is reputed the best in the world for brewing. The chief tree crop is the carob or locust-bean. The tree, about the size of an apple-tree, grows wild, but is grafted for cultivation ; its large pods, which ripen in August, are exported for cattle food, chiefly to England, though in Egypt and the Levant it is also eaten by the poor, and jelly is made from the seeds. The olive is also native, but is usually transplanted and grafted ; the local crop barely supplies the demand, and is supplemented by imports, and by oil from sesame and other seeds. Wine is made in large quantities, but mostly by small growers working empirically, and still often supplementing the flavour of goatskins with that of pitch. Several English wine companies, however, have succeeded in putting a sound red wine on the market. The old *comanderia* wine, sweet and strong, from half-dried grapes, which was exported copiously in Venetian times, is still made in the north-west. Much coarse grape-spirit and mastic-liqueur are made everywhere for local consumption ; and a good brandy, for export, about Limassol. The vinegar of Cyprus also has a good sale in Syria and Asia Minor. Besides wine, raisins are produced in large quantities and are exported. Figs, plums, apricots, and other tree fruit, including oranges and lemons (near Famagusta), grow well, and the villagers have some skill in drying and

preserving them, but have not been induced to prepare them for export. Walnuts and hazel-nuts grow freely in the hills, and garden fruit and vegetables, which are easily raised in irrigated land, are grown in quantity for the Egyptian market, since the establishment of a regular steamer service.

Irrigation has been long practised by individuals or villages, but on a small scale, with wells and springs and the aid of primitive water-wheels turned by draught animals. A more considerable work was the water-supply conveyed by a Turkish governor to Larnaka in 1745, but this was mainly for urban and domestic use. Since 1896 five considerable storage-works have been constructed in the valleys which open on the Mesaoria, and a large scheme of reclamation and irrigation combined has been partly executed; but the utility of them all is still restricted by the apathy and inexperience of the cultivators. With intelligence and co-operation a large part of the area susceptible of cultivation could be brought under irrigation, and the yield of land already cultivated could be greatly increased.

In the earlier years of the occupation, disastrous damage was done by an indigenous locust (*Stauronotus cruciatus*); but by vigorous organization and large expenditure (as much as £30,000 in 1881-2) this pest has been overcome, and now only needs attention for a few weeks in the spring when the insects hatch out. The annual cost of the 'locust-war' is now seldom more than £3,000, and decreases rapidly. Until recently the eggs and immature insects were collected by hand, but arsenic poisoning has now been tried, with the same effect and economy as in South Africa.

Copper, which has its name from Cyprus, was obtained in antiquity on a very large scale, and copper-mines of various dates are to be seen in several localities, among the old crystalline rocks; but for want of fuel, or of pumping power, none is worked now, though proposals for reopening them are made from time to time. Asbestos has been quarried since ancient times, and is now obtained

Mineral
wealth.

on a large scale at Amiandos, on the east side of the Troödos range : the *amiando* of Cyprus is of short fibre, but is valued for fireproof tiles. Gypsum is worked for plaster of Paris, and building-stone of several qualities is exported, as well as umber and terre-verte. Natural salt-pans are worked near Larnaka and Limassol ; they are a government monopoly, but the methods are primitive, though the salt is of good quality.

Fisheries. Fishing is confined to a few coast villages, and hardly satisfies the local demand ; and the sponge-fisheries are worked, under government licence, by Greeks from the Archipelago. An attempt in 1903 to train Cypriote sponge-fishers failed.

Manufacturing industries. Manufactures are in their infancy. There is a small cotton-mill at Famagusta, potteries at Limassol, Nicosia, Famagusta, and a growing cigarette industry, which uses mainly Macedonian, but also now some Cypriote tobacco. The native iron-work, copper, and leather-work, and preserved and dried fruits are good, but hardly meet local needs.

Transportation. A subsidized mail steamer runs weekly from Alexandria and Port Said to Famagusta (23 hours from Port Said), Larnaka, Limassol, and Paphos ; other steamers, British, French, Austrian, and Italian, call at weekly or longer intervals ; and there is some sailing traffic with ports of Syria, Asia Minor, and Greece. The open roadsteads of Larnaka and Limassol are still the principal ports ; but the mediaeval harbour of Famagusta has been dredged and enlarged, and provided with rail-head and quays, at a cost of £126,000 since 1907. A new pier offers some protection at Larnaka, and moles have been added to the mediaeval port of Kerynia, which harbours small craft in rough weather, but has little trade. From Famagusta a narrow-gauge railway runs to Nicosia, and on to Morphu at the far end of the Mesaoria ; and there are now 760 miles of public roads constructed since 1878. Some of these are fit for motor traffic, either all the year round, or in the dry season ; and there is a daily motor service between Nicosia, Larnaka, and Limassol. Under

a law of 1900 each able-bodied villager has to give six days' labour annually to public works, conducted by the local authority, under the direction of the Commissioner of the District and the Public Works Department; and much of this is expended on improving the roads. But many villages are still served only by unmetalled roads or by bridle-paths. There are hotels at all the six towns, and at the summer health resorts on Troödos, which deserve to be better known: the larger monasteries, too, have guest rooms, and supply food to travellers; and in most villages a room can be hired, though the traveller's own tent and bed still have advantages.

The postal service is on the European model, and the island has its own series of postage stamps. The mail to Egypt gives connexion with England and other parts. The Eastern Telegraph Company has a cable to Alexandria, and offices in the six towns and the summer stations. There is also a Turkish telegraph system, with three stations, and a cable which does not now convey messages.

The exports in 1911 were valued at £702,803, whereas Trade in 1906 they were £483,956, and in 1864 only £325,000. The principal items in 1911 were as follows, in order of importance: carobs, live-stock (chiefly mules), grain (chiefly barley for brewing), wine (and a little spirit), raisins and other fruit, silk cocoons, wool and skins, cotton, cheese, sponges, and gypsum. Of these exports, by value, £210,647 went to Egypt, the nearest large mainland population; £168,753 to the United Kingdom, £87,654 to France, £60,184 to Turkey, and the rest mainly to Italy and Greece, and to Austria and Rumania for Central European consumption. The imports in 1911 were valued at £635,427, against £604,054 in 1906, and £199,000 in 1864. The principal items in 1911 were textiles (chiefly cotton and woollen), specie, wheat and flour, hardware (chiefly iron), sugar, tobacco, petroleum (chiefly for lighting), soap, leather, government stores, timber, and coffee. These imports were derived as follows: £147,574 from the United Kingdom, £73,029 from Austria (representing mainly Central European

industries), £68,278 from Turkey, £67,362 from Italy, only £53,521 from Egypt, and £39,822 from France.

Money,
weights,
measures,
banking.

The currency consists of English gold, and silver and copper pieces based on a local unit, the 'copper piastre', of which nine go to an English shilling. The copper piastre is divided into 40 paras, but the para is now only a money of account, the smallest coin being of 10 paras ($= \frac{1}{4}$ c. p.). The weights and measures are partly English, partly customary native units common to Greek lands and Turkey, but regulated now by the Standard Law of 1890. The Ottoman Bank has offices or agents in all the principal towns; there are branches of the Bank of Athens, and an agricultural bank managed under a monopoly by an Egyptian company. In all the principal towns there are Government Savings Banks, but they are not greatly used, except by Europeans and public servants.

Social and Political Conditions

Ethno-
logy and
remains of
antiquity.

The earliest human occupants seem to have been of Mediterranean type, modified early by admixture of Armenoid strains from Asia Minor and Syria, and by extensive colonization from the shores of the Aegean, in the Later Bronze Age. The first settlements reveal a pastoral and agricultural folk, living in unwallled villages of wood or mud-brick, which have usually left almost no traces: they buried their dead in chamber-tombs excavated in the soft limestones, and made simple implements of copper, probably from the native ores, and much rough pottery, in fabric like the red ware of primitive Egypt, but in form and ornament more akin to the first styles in Asia Minor. Foreign imports of pottery and beads begin about the time of the Twelfth Egyptian Dynasty, and foreign settlements, of western folk, sea-borne, under the Eighteenth, about 1400 B. C. Cyprus thus became an outpost eastwards of the late Minoan or Mycenaean culture of Crete and the Aegean. To this period belong the rich tombs at Enkomi, and probably the massive stone chamber known as the 'Prison of

St. Katharine'. The collapse of this civilization, after 1200 B.C., left its Cypriote settlements isolated, and exposed to new influences, mainly from Syria and Asia Minor, which make the culture of the Early Iron Age peculiarly complex and obscure. All that is certain is that the island maintained its repute as a source of copper and iron, and enjoyed insular immunity from the worst turmoils of this period. Then, with the rise of Assyria, after 750, and the revival of Egypt after 664 B.C., the new 'Mixed Oriental' style, which had one of its headquarters in the Phoenician cities, became dominant; but not before Greek enterprise had been resumed in the Levant. The result, once more, was a mixed 'Graeco-Phoenician' civilization, and an ambiguous political position; western interests being centred round Salamis on the east coast, and Soli on the north; eastern, round Kition and Amathus on the south coasts, and the great sanctuary of Idalion on the south edge of the Mesaoria. The principal classes of remains belonging to this period are the sculptures and inscriptions from the sanctuaries, and the pottery, metal-work, and jewellery from the tombs. The statues, which usually represent deities or their votaries, exhibit a sequence of styles influenced in turn by those of Assyria, Egypt, and the Greek schools of the sixth, fifth, and fourth centuries, but always qualified by the peculiarities, or the unskillfulness, of the local artists. The inscriptions are occasionally in Phoenician language and lettering, but more usually in a dialect of Greek, akin to that of Arcadia, and written in a peculiar syllabic script, probably derived in part from the Minoan writing of Crete. A few still defy translation, and may represent an indigenous language. Later, the ordinary Greek alphabet is used. After falling in succession under Egyptian and Persian rule (about 550-525 B.C.), and revolting unsuccessfully against the latter in 500-498 B.C., Cyprus was momentarily and partially freed by Athenian help, 460-449 B.C., and a little later, under a native chief, Evagoras of Salamis, 411-378 B.C., attained to brief and brilliant independence; only to fall once more under

Persian protection, and (after Alexander's conquest) to become first a dependency of the new Greek kingdom of Egypt (295 B.C.), and then a possession (58 B.C.), and a province (31 B.C.) of the Roman Empire. Under Egyptian rule a large Jewish settlement grew up, and Christianity took root here early; the Apostle Barnabas being a Levite of Salamis, where his reputed tomb is shown. The Church of Cyprus has always claimed independence, but is not distinguished in doctrine or ritual from other orthodox Churches of the East. It had at one time as many as twenty bishoprics (of which four survive), and is governed by an archbishop, who has the privilege of wearing purple and signing his name in Imperial colour. At the division of the Roman Empire, Cyprus passed under the rule of the Emperors of Byzantium; but its great prosperity was marred by Arab raids from 644 to 975, and by the misrule of more or less independent princes until 1191, when Isaac Comnenus provoked Richard I of England to annex it in self-defence on his way to Palestine. The Byzantine churches have for the most part been rebuilt, but that of Kiti near Larnaka, and one or two others, contain mosaic decoration. Other Byzantine monuments are rare, but two remarkable finds have been made, in recent years, of silver plate, belonging to the sixth or seventh century.

The
mediaeval
period.

Richard sold the island almost at once to the Knights Templar, and they in turn to Guy de Lusignan, King of Jerusalem, whose dynasty ruled, in western feudal fashion, for three centuries, in spite of a Genoese occupation of Famagusta from 1376 to 1464, and increasing danger from the Turks on the mainland. To the Lusignan period belong the great Gothic churches of Nicosia and Famagusta, now for the most part ruined or used as mosques, the abbey of Bella Pais on the north coast, the castles of Kerynia, St. Hilarion, Buffavento, Kantara, and Limassol, the towers of Kolossi, Kiti, and Pyla, the later castle of Paphos, and the fortifications of Nicosia and Famagusta. Those of Nicosia, completed in 1372, had a circuit of four miles, but were reduced to three by the

Venetians after 1564 ; they are still 30 to 40 feet high, with eleven bastions, and two of the ancient gates are still in use. In 1489, however, after the death of her husband and son (James II and III), Queen Caterina Cornaro abdicated in favour of her fatherland, the republic of Venice. The severity of Venetian rule, greater even than that of the Lusignan kings, and particularly the intolerance of the Latin hierarchy, soon gave the Turks their chance. In 1570, under Selim II, they reduced the open country without difficulty, captured the Lusignan capital, Nicosia, and massacred its inhabitants, and reduced Famagusta, then one of the richest ports of the East, after a siege of nearly a year. The history of Cyprus under Turkish rule is without incident, except an insurrection in 1764.

• On June 4, 1878, Great Britain signed a convention with Turkey, engaging to join the Sultan in defending his Asiatic possessions against Russia ; and Turkey, 'to enable England to make the necessary provision for executing her engagement', assigned Cyprus to be occupied and administered by the English. A tribute of £92,800, estimated as average excess of revenue over expenditure, was to be payable annually to Turkey, but is reserved for the payment of interest on the guaranteed loan of 1855. British acquisition.

The population was estimated in 1881 at about 185,000, and in 1911 was returned as 273,964. About 20 per cent. are Muhammadans, representing the descendants of the Turkish conquerors, or converts to their faith. The remainder are nearly all orthodox Greek Christians. In the country districts Christian and Muhammadan villages are usually distinct and homogeneous, and in the towns each faith has its own quarter, though there is inevitably more intercourse here, except in moments of political excitement. The Muhammadans are careful to retain their own social customs ; the Christians aspire to Greek mobility of thought, and readily acquire cosmopolitan manners. Their political sympathies are readily aroused by the fortunes and aspirations of the Greek kingdom. Population.

A dialect of Greek is in almost universal use, but many Muhammadans speak Turkish among themselves. English is used by officials, but is not generally understood, and both Turkish and Greek are recognized in the Council and the Courts. Besides the official *Cyprus Gazette*, there are two English magazines, three Turkish newspapers, and sixteen Greek newspapers and magazines. A few families in the towns speak Italian or French; the Maronite Christians use Arabic; there are about 500 Armenians, and some 200 Jews, drawn from Palestine, Russia, and Whitechapel. A colony of Dukhobortsi (Dukhobors), refugees from Russia, only lasted a few months, and then moved on to Canada.

Govern-
ment
under
the British
Protec-
torate.

The island is administered by a High Commissioner, who has the powers of a colonial governor, under the same general control as is exercised by the Secretary of State over Crown colonies. His executive council includes the chief secretary, king's advocate, officer commanding the troops, receiver-general, two Christian Cypriotes, and one Muhammadan. The legislative council consists of six officials, and twelve elected members, of whom three represent Muhammadan electors, and nine the non-Muhammadan. Electors are qualified by payment of certain direct taxes. The old Turkish administrative council (*Mejliss Idare*) still exercises restricted control of assessment and taxation. For administrative purposes there are six districts, adopted from the old Turkish *Kazas*, each governed by a commissioner, who has the power of a Turkish kaimakam: they are further subdivided into three or four *Nahiehs*, administered by a *Mudir*, who is usually a Cypriote. The village headmen (*Mukhtars*) are elected every alternate year, and are assisted by an elected council of four. In the towns and principal villages a municipal council controls the water-supply, lighting, draining, roads, and other local services, and may levy rates on property, but usually prefers to raise revenue indirectly by fees and tolls. The Cyprus military police is a highly-trained force of about 700 men, of whom over 400 are Muhammadans, and about 250

are mounted. They are armed with carbine and sword bayonet,* and are charged with many administrative duties, as well as the preservation of order. The only other armed force in the island is a company of British infantry detached from the garrison of Alexandria, and stationed in winter at Polemidia Camp, near Limassol, and in summer at Troödos.

The revenue in 1911-12 was £369,572, including Finance. a British government grant of £50,000, which replaces earlier grants of the varying amounts required to extinguish the almost invariable deficits. Expenditure in 1911-12 was £328,055, including the Turkish tribute of £92,800. Besides direct taxes on houses, land, profits, there are customs, port-dues, tithes on certain crops, taxes on sheep, goats, and pigs, excise on wine, spirits, and tobacco, sundry royalties and fees, and a poll-tax exempting from Turkish military service.

The Ottoman code of law is in force for Ottoman Law and justice. subjects, all others being under English law; but both codes are modified in detail by enactments of the legislative council. The Turkish courts of justice were replaced in 1882 by a supreme court of civil and criminal appeal, an assize court for each district, six district courts with a British president, and Muhammadan and Christian assessors, of limited criminal jurisdiction, six magistrate's courts, and a number of village courts. Five small district jails are in use for short-sentence prisoners, but all serious offenders are sent to the central prison at Nicosia, where industrial training is given.

Education is not compulsory, but elementary schools Education. are maintained by village committees, under the general supervision of district committees, and separate boards of education for Muhammadan and for Christian schools. Government inspectors visit all schools, and small public grants are made in special cases. Separate high-schools exist for Muhammadans, Greeks, and English, but an English grammar school in Nicosia attracts all alike, and also draws pupils from Egypt and other neighbouring countries. The 'old Turkish boys' school is maintained

by government ; and the Cyprus Gymnasium, which has a staff of Athenian^t graduates, receives a government grant for its training of elementary schoolmasters ; the rest are paid for from private or ecclesiastical sources. The small Armenian and Maronite communities have state-aided schools of their own.

Public
health.

Public health is the charge of a government medical department, which has its own scientific laboratory. There are six hospitals, of which that at Nicosia is wholly maintained by government, and has a dispensary, eye-hospital, and consumptive and maternity wards. The others are municipal or private, but receive government grants for dispensary and other purposes. There are special establishments for lunatics and lepers, and there is a branch of the Colonial Nursing Association. The summer stations on Troödos have a growing reputation as a health resort, and several medicinal springs have begun to attract more than local attention.

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GAZETTEER OF TOWNS IN THE BRITISH ISLES

(*Note*.—The towns included in this list have been selected partly on a basis of population, but also, especially in the case of certain smaller towns, with reference to their importance in relation to the localities in which they are situated. The list for England and Wales includes all county boroughs and towns with populations exceeding 100,000. The populations are according to the census of 1911; the figures for increase or decrease per cent. refer to the decade preceding that year. Distances quoted are by rail. Co. = county; bor. = borough; mfrs. = manufactures.)

ENGLAND AND WALES

- **Barnsley**, $53^{\circ} 33' \text{ N.}, 1^{\circ} 28' \text{ W.}$; co. bor., W. Riding of Yorkshire, on the Dearne, 174 m. NNW. of London; is situated in a rich coal and iron mining district, and is built partly on the summits and partly on the slopes of two hills. It is one of the chief seats of the linen manufacture, and has iron foundries, paper-mills, bleach-grounds, and glass works. Pop. 50,614; increase 23.2 per cent.

Barrow-in-Furness, $54^{\circ} 7' \text{ N.}, 3^{\circ} 13' \text{ W.}$; seaport, co. bor., N. Lancashire, situated at the extremity of the Furness peninsula, opposite Walney Island, 265 m. NW. of London; is the centre of a district producing copper and haematite iron ore. It has large iron and steel works, ship-building yards, naval armament works, railway workshops, jute, flax, and paper mills, and rope, sail, and wire works. Pop. 63,770; increase 10.7 per cent.

Bath, $51^{\circ} 23' \text{ N.}, 2^{\circ} 22' \text{ W.}$; co. town of Somerset, beautifully situated on the Avon, 107 m. W. of London; is a well-known inland watering-place, with hot springs ($90\text{--}117^{\circ} \text{ F.}$), for the use of which, at the time of the Roman occupation, there is much interesting architectural evidence. Pop. 50,721; increase 1.8 per cent. Bishopric of Bath and Wells (cathedral at Wells).

Bedford, $52^{\circ} 8' \text{ N.}, 0^{\circ} 28' \text{ W.}$; co. town of Bedfordshire, on river Ouse, 50 m. NW. of London; is the centre of a fertile agricultural district, and has large agricultural implement works and engineering works. Pop. 39,184; increase 11.5 per cent.

Birkenhead, $53^{\circ} 24' \text{ N.}, 3^{\circ} 2' \text{ W.}$; seaport, co. bor., Cheshire, situated on the left bank of the Mersey, opposite Liverpool, 104 m. NW. of London; is provided with extensive docks and has ship-building yards, flour mills, and machinery and engineering works. Pop. 139,704; increase 17.9 per cent.

Birmingham, $52^{\circ} 28' \text{ N.}, 1^{\circ} 54' \text{ W.}$; co. bor., Warwickshire, the metropolis of the Midlands, 113 m. NW. of London, situated near the centre of England, on the margin of a great industrial district; is the principal seat of the hardware industry, consisting of articles in iron, steel, brass, copper, silver, and gold. Has large mfrs. of fire-arms, swords, railway engines and carriages, machinery, cycles, rubber tyres, jewellery and electro-plated goods, toys, steel pens, chemicals, fancy goods in leather, wood, and papier

maché, buttons, electrical appliances, and mint for copper and bronze money. Seat of a university, and of an Anglican bishop and Roman Catholic archbishop. Pop. 525,833; increase 0.5 per cent.

Blackburn, 53° 45' N., 2° 28' W.; co. bor., Lancashire, 210 m. NW. of London; is one of the chief seats of the cotton industry; has also mfrs. of textile machinery and steam-engines. Pop. 133,052; increase 3.0 per cent.

Blackpool, 53° 49' N., 3° 3' W.; co. bor., Lancashire, pleasantly situated on the west coast, between the estuaries of the Ribble and Wyre, 227 m. NW. of London; is a much-frequented seaside resort. Pop. 58,371; increase 23.3 per cent.

Bolton, 53° 33' N., 2° 26' W.; co. bor., SE. Lancashire, 196 m. NW. of London; is one of the oldest and principal seats of the cotton-spinning industry; it has, besides, large iron and steel works, bleaching works, and mfrs. of machinery, chemicals, and paper; collieries in the vicinity. Pop. 180,851; increase 7.5 per cent.

Bootle, 54° 17' N., 3° 21' W.; seaport, co. bor., SW. Lancashire, to the N. of and adjoining Liverpool, at the mouth of the Mersey, 201 m. NW. of London; has jute mills, iron foundries, engineering works, tanneries, and corn mills. Pop. 69,876; increase 16.0 per cent.

Bournemouth, 50° 43' N., 1° 53' W.; co. bor., Hampshire, on the south coast, on Poole Bay, 110 m. SW. of London; is a favourite health resort, situated in and about the pine-clad valley of the Bourne, and has a fine dry climate. Pop. 78,674; increase 31.6 per cent.

Bradford, 53° 48' N., 1° 45' W.; co. bor., W. Riding of Yorkshire, situated on an affluent of the Aire, 192 m. NNW. of London; is the chief seat of the worsted and woollen goods industry, and has also mfrs. of mixed cotton and silk goods, alpaca, velvet, and plush, and large iron foundries; coal and iron mines in the neighbourhood. Pop. 288,458; increase 3.1 per cent.

Brighton, 50° 49' N., 0° 10' W.; co. bor., Sussex, situated on the south coast, 51 m. S. of London; is a favourite seaside resort; has extensive herring and mackerel fishery. Pop. 131,237; increase 6.3 per cent.

Bristol, 51° 26' N., 2° 35' W.; seaport, co. bor. and episcopal city, situated in Gloucestershire and Somersetshire, but itself forming a county, on the Avon, 6 m. from its mouth, 118 m. W. of London, occupies a hilly site. It is provided with well-equipped docks at the mouth of the river (Avonmouth, Portishead), and has extensive ship-repairing yards, iron foundries, engineering works, tanneries, and mfrs. of chemicals, tobacco, cocoa, sugar, starch, soap, stained paper, and sail-cloth. Seat of a university. Pop. 357,048; increase 5.3 per cent.

Burnley, 53° 48' N., 2° 11' W.; co. bor., NE. Lancashire, situated at the confluence of the Burn and the Calder, 212 m. NW. of London; has extensive cotton-spinning and weaving mills, and mfrs. of textile machinery and sanitary earthenwares; coal, slate, freestone in the neighbourhood. Pop. 106,322; increase 9.6 per cent.

Burton-upon-Trent, 52° 48' N., 1° 39' W.; co. bor., Staffordshire, on the Trent, 122 m. NW. of London; has large breweries, and also engineering and motor-car works; coal, fire-clay, and potteries in the neighbourhood. Pop. 48,266; decrease 4.2 per cent.

Bury, 53° 35' N., 2° 17' W.; co. bor., SE. Lancashire, situated on rising ground between the rivers Irwell and Roach, 199 m. NW. of London; has numerous cotton-spinning and weaving mills, bleach and dye works, iron foundries and engineering works, and mfrs. of woollen goods, hats,

and paper; coal mines and stone quarries in the neighbourhood. Pop. 58,648; increase 1·1 per cent.

Cambridge, 52° 12' N., 0° 7' E.; co. town of Cambridgeshire, on the Cam, 56 m. N. by E. of London; is the seat of a famous university. Pop. 55,812; increase 10·6 per cent.

Canterbury, 51° 16' N., 1° 4' E.; co. bor., E. Kent, situated on the Stour, 62 m. SE. of London; is the seat of the Archbishop of Canterbury, the Primate of all England. It is the centre of an agricultural district, and has a trade in grain, hops, and malt; mfrs. of linen and worsted. Pop. 24,626; decrease 1·1 per cent.

Cardiff, 51° 28' N., 3° 10' W.; seaport, co. town of Glamorganshire, situated at the mouth of the river Taff and on the estuary of the Severn, 15·3 m. W. of London; is the largest coal-exporting port in the United Kingdom, and has iron foundries, tinplate works, and ship-building yards. Pop. 182,250; increase 10·9 per cent.

Carlisle, 54° 53' N., 2° 50' W.; co. town of Cumberland, episcopal city, situated on a slight eminence at the confluence of the rivers Eden, Ullswater, and Petteril, 209 m. NW. of London; is an important railway centre (junction of English and Scottish lines). It has large mfrs. of cottons, linen, woollens, iron, leather, biscuits, hats, and carpets, and extensive trade in timber and cattle. Pop. 46,420; increase 2·1 per cent.

Chatham, mun. bor. Pop. 42,250; increase 14·0 per cent. See **Rochester**.

Chelmsford, 51° 44' N., 0° 28' E.; co. town of Essex, situated in the valley of the Chelmer, near its junction with the Cam, 30 m. ENE. of London; has mfrs. of agricultural implements, electric-light apparatus, corn mills, tanneries, breweries, and iron foundries. The Marconi Wireless Telegraph Company has erected large works here. Seat of a bishop. Pop. 18,008; increase 15·6 per cent.

Chester, 53° 12' N., 2° 52' W.; co. town of Cheshire, episcopal city, picturesquely situated on and about a rocky elevation on right bank of river Dee, 179 m. NW. of London; is an important railway centre, and has mfrs. of paint, patent shot, lead piping, tobacco, boots and shoes, machinery, and iron foundries. Pop. 39,028; increase 1·9 per cent.

Coventry, 52° 24' N., 1° 31' W.; co. bor., Warwickshire, situated on the Sherbourne, 94 m. NW. of London; is a chief seat of the mfrs. of ordnance, cycles, and motor-cars, and an emporium of the ribbon trade; has besides large mfrs. of silks, watches, and machinery. Pop. 106,349; increase 52·0 per cent.

Crowe, 53° 7' N., 2° 27' W.; mun. bor., Cheshire, 158 m. NW. of London; is an important railway junction, and contains some of the largest railway workshops in the world, belonging to the London and North Western Railway Company. Pop. 44,960; increase 6·9 per cent.

Derby, 52° 55' N., 1° 28' W.; co. town of Derbyshire, on river Derwent, 127 m. NNW. of London; is situated nearly in the middle of England. It contains the principal workshops of the Midland Railway Company, and has large iron-works and important mfrs. of silks, lace, and porcelain. Pop. 123,410; increase 7·5 per cent.

Devonport, co. bor. Pop. 81,678; increase 16·0 per cent. See **Plymouth**.

Durham, 54° 46' N., 1° 34' W.; co. town of Durham, episcopal city, situated on a rocky eminence nearly surrounded by the river Wear, 254 m. N. of London; has mfrs. of carpets, and iron and brass foundries; coal mines in the vicinity. Seat of a university. Pop. 17,550; increase 8·7 per cent.

Eastbourne, $50^{\circ} 46' \text{ N.}, 0^{\circ} 17' \text{ E.}$; co. bor., Sussex, situated on the south coast, 66 m. SSE. of London; is a favourite watering-place. Pop. 54,542; increase 20.6 per cent.

Exeter, $50^{\circ} 43' \text{ N.}, 3^{\circ} 31' \text{ W.}$; port, co. town of Devonshire, episcopal city, situated on an eminence 150 feet above the river Exe, 171 m. WSW. of London; has mfrs. of 'Honiton' lace, art pottery wares, paper, and corn mills, and iron foundries. Pop. 48,664; increase 3.1 per cent.

Gateshead, $54^{\circ} 57' \text{ N.}, 1^{\circ} 35' \text{ W.}$; seaport, co. bor., Durham, on right bank of river Tyne, opposite Newcastle, 270 m. N. of London; has the same industries as Newcastle (q.v.). Pop. 116,917; increase 6.4 per cent.

Gloucester, $51^{\circ} 52' \text{ N.}, 2^{\circ} 15' \text{ W.}$; port, co. town of Gloucestershire, episcopal city, situated on river Severn, 114 m. WNW. of London; has ship-building and engineering works, flour and saw mills, mfrs. of machinery, cutlery, agricultural implements, rope, sails, sacks, chemicals, bricks, and breweries. Pop. 50,035; increase 4.3 per cent.

Grimsby, $53^{\circ} 34' \text{ N.}, 0^{\circ} 5' \text{ W.}$; seaport, co. bor., N. Lincolnshire, situated near the mouth of river Humber, 155 m. NNE. of London; is the most important fishing port in England, and has rope works, tanneries, flax, bone-crushing and paper mills, breweries, and ship-building. Docks, &c., at Immingham in the vicinity. Pop. 74,659; increase 18.2 per cent.

Halifax, $53^{\circ} 44' \text{ N.}, 1^{\circ} 50' \text{ W.}$; co. bor., W. Riding of Yorkshire, situated near the river Calder, 191 m. NNW. of London; is one of the chief seats of the woollen and worsted mfrs. Carpets, damasks, cashmeres, blankets, as well as iron goods, machinery, and chemicals are produced; collieries and stone quarries in the vicinity. Pop. 101,553; decrease 3.2 per cent.

Hastings, $50^{\circ} 51' \text{ N.}, 0^{\circ} 36' \text{ E.}$; seaport, co. bor., E. Sussex, 61 m. SSE. of London; lies in a well-sheltered hollow sloping towards the sea, and is a favourite watering-place. Pop. 61,145; decrease 6.7 per cent.

Hereford, $52^{\circ} 3' \text{ N.}, 2^{\circ} 43' \text{ W.}$; co. town of Herefordshire, episcopal city, situated on a gentle eminence on river Wye, 144 m. NW. of London; has trade in agricultural produce. Pop. 22,568; increase 5.5 per cent.

Huddersfield, $53^{\circ} 38' \text{ N.}, 1^{\circ} 46' \text{ W.}$; co. bor., W. Riding of Yorkshire, situated on the slope of a hill in the valley of the river Colne, 189 m. NW. of London; is an important centre of the plain and fancy woollen goods industry, and also of fancy goods in worsted, silk, and cotton; mfrs. of textile machinery; collieries and stone quarries in the vicinity. Pop. 107,821; increase 13.4 per cent.

Hull, or Kingston-on-Hull, $53^{\circ} 44' \text{ N.}, 0^{\circ} 20' \text{ W.}$; seaport, co. bor., E. Riding of Yorkshire, on the estuary of the Humber, 198 m. N. of London; has large flax, cotton, and flour mills, engineering and ship-building yards, rope and sail works, and mfrs. of chemicals, oil, paint, and colours; fishing port. Pop. 277,991; increase 15.7 per cent.

Ipswich, $52^{\circ} 4' \text{ N.}, 1^{\circ} 9' \text{ E.}$; port, co. town of Suffolk, on river Orwell, 69 m. NE. of London; has mfrs. of iron, agricultural implements, and manures. There is a bishopric of St. Edmundsbury and Ipswich. Pop. 73,932; increase 11.0 per cent.

Lancaster, $54^{\circ} 3' \text{ N.}, 2^{\circ} 48' \text{ W.}$; port, co. town of Lancashire, on river Lune, 230 m. NW. of London; has mfrs. of furniture, oilcloth, cotton goods, railway carriages, machinery, and stained glass. Pop. 41,410; increase 2.7 per cent.

Leeds, $53^{\circ} 48' \text{ N.}, 1^{\circ} 33' \text{ W.}$; co. bor., W. Riding of Yorkshire, on river Aire, 185 m. NW. of London; is the chief centre of the woollen-goods

industry, and of clothing mfr. in all its branches. Has also large mfrs. of iron, machinery, railway plant, glass, earthenware, leather, boots and shoes, tobacco, chemicals and silk, and breweries. Seat of a university and of Roman Catholic bishop. Pop. 445,550; increase 3.9 per cent.

Leicester, $52^{\circ} 37' N.$, $1^{\circ} 9' W.$; co. town of Leicestershire, on river Soar, 98 m. NW. of London; is the chief centre of the worsted hosiery industry, and has also extensive mfrs. of elastic web, lace, sewing cotton, leather, boots and shoes, and tobacco. Pop. 227,222; increase 7.4 per cent.

Lincoln, $53^{\circ} 14' N.$, $0^{\circ} 33' W.$; co. town of Lincolnshire, episcopal city, on river Witham, 130 m. NNW. of London; has trade in agricultural produce and cattle, and mfrs. of agricultural implements, machinery, and locomotives. Pop. 57,285; increase 17.4 per cent.

Liverpool, $53^{\circ} 24' N.$, $2^{\circ} 59' W.$; seaport, co. bor., SW. Lancashire, on estuary of the Mersey, 201 m. NW. of London; is one of the leading ports in the British Empire, and the principal port for emigrants in the kingdom. The chief article of import is cotton, while cotton and woollen goods and iron and steel mfrs. are the chief exports. Has ship-building yards, iron and brass foundries, marine engine works, sugar refineries, rice and flour mills, breweries, tobacco factories, cable, anchor, and rope works. Seat of a university, Anglican bishop, and Roman Catholic archbishop. Pop. 746,421; increase 6.0 per cent.

London, $50^{\circ} 30' 48'' N.$, $0^{\circ} 5' 48'' W.$ (the centre of the dome of St. Paul's Cathedral); the capital of England, the chief city of the British Empire, and the greatest city in the world, is situated on both sides of the Thames, 50 m. above its mouth. Pop. (of county of London) 4,521,685; decrease 0.3 per cent.; of Greater London, 7,251,358; increase 10.2 per cent.

Maldstone, $51^{\circ} 17' N.$, $0^{\circ} 32' E.$; co. town of Kent, on river Medway, 40 m. SE. of London; is the centre of a large hop growing district, and has breweries, paper mills, and agricultural implement works. Pop. 35,475; increase 5.8 per cent.

Manchester, $53^{\circ} 27' N.$, $2^{\circ} 14' W.$; city and co. bor., SE. Lancashire, on E. side of river Irwell, with port on the Manchester Ship Canal, 183 m. NW. of London; is the commercial centre of the great cotton manufacturing district of this county. Its mfrs. also include bleaching and dyeing, woollen and silk goods, engineering works, machinery, and chemicals. It is an episcopal city and has a university. Pop. 714,333; increase 10.8 per cent.

Merthyr Tydfil, $51^{\circ} 45' N.$, $3^{\circ} 22' W.$; co. bor., Glamorganshire, situated on the river Taff, surrounded by lofty and bleak hills, 176 m. W. of London; is the centre of extensive coal-fields, and has numerous iron and steel works. Pop. 80,990; increase 17.0 per cent.

Middlesbrough, $54^{\circ} 34' N.$, $1^{\circ} 14' W.$; port, co. bor., N. Riding of Yorkshire, on Tees' estuary, 239 m. N. by W. of London; is the centre for the Cleveland iron-producing district and one of the principal seats of the British iron trade. It has large blast furnaces, iron and steel works, engineering, chemical, and salt works, saw mills, and ship-building yards; export of coal. Seat of Roman Catholic bishop. Pop. 104,767; increase 14.7 per cent.

Newcastle-upon-Tyne, $54^{\circ} 58' N.$, $1^{\circ} 36' W.$; port, episcopal city, co. bor., Northumberland, on river Tyne, 10 m. from its mouth, 271 m. N. of London; is situated in the centre of one of the largest coal-fields in England. It has ordnance works, ship-building yards, and mfrs. of locomotive and marine engines, machinery, cables, and chemicals; large coal export. Seat of Anglican and Roman Catholic bishops. Pop. 266,603; increase 2.9 per cent.

Newport, $51^{\circ} 32' \text{ N.}, 2^{\circ} 59' \text{ W.}$; seaport, co. bor., Monmouthshire, situated near the mouth of the river Usk, 141 m. W. of London; has large iron works, ship-building yards, and mfrs. of cables, anchors, railway plant, agricultural implements, glass, and chemicals; extensive trade in coal and iron. Seat of Roman Catholic bishop. Pop. 83,691; increase 24.4 per cent.

Northampton, $52^{\circ} 14' \text{ N.}, 0^{\circ} 52' \text{ W.}$; co. town of Northamptonshire, on river Nen, 66 m. NW. of London; is the chief seat of the boot and shoe mfr., and has also large tanneries, iron foundries, and brick works. Seat of Roman Catholic bishop. Pop. 90,064; increase 3.5 per cent.

Norwich, $52^{\circ} 38' \text{ N.}, 1^{\circ} 18' \text{ E.}$; co. town of Norfolk, episcopal city, on River Wensum, 114 m. NE. of London; has woollen, worsted, and silk mills, and mfrs. of mustard, starch, chocolate, boots, clothing, and ornamental ironwares. Pop. 121,478; increase 6.6 per cent.

Nottingham, $52^{\circ} 57' \text{ N.}, 1^{\circ} 11' \text{ W.}$; co. town of Nottinghamshire, on river Trent, 123 m. NNW. of London; is the centre of the cotton hosiery and lace industry; has also mfrs. of textile machinery, leather, and cycles. Seat of Roman Catholic bishop. Pop. 259,904; increase 8.4 per cent.

Oldham, $53^{\circ} 32' \text{ N.}, 2^{\circ} 7' \text{ W.}$; co. bor., SE. Lancashire, on river Medlock, 186 m. NW. of London; is one of the principal centres of the cotton industry, the staple products being fustians, velvets, satins, calicoes, sheetings, and cotton yarn. Has also large works for textile machinery, iron foundries, and extensive collieries in the vicinity. Pop. 147,483; increase 7.5 per cent.

Oxford, $51^{\circ} 45' \text{ N.}, 1^{\circ} 15' \text{ W.}$; co. town of Oxfordshire, episcopal city, situated between the rivers Cherwell and Thames (locally called the Isis), 63 m. WNW. of London; is the seat of a famous university. Pop. 53,048, increase 7.5 per cent.

Peterborough, $52^{\circ} 35' \text{ N.}, 0^{\circ} 15' \text{ W.}$; episcopal city, NE. Northamptonshire, situated on river Nen, 76 m. N. of London; is the centre of an agricultural district, and has engineering works, large locomotive works, and manufacture of agricultural implements and bricks. Pop. 33,574; increase 8.8 per cent.

Plymouth, $50^{\circ} 20' \text{ N.}, 4^{\circ} 8' \text{ W.}$; seaport, naval station, co. bor., S. Devonshire, on Plymouth Sound, 227 m. WSW. of London; consists, in a larger sense, of the 'Three Towns' of Devonport, Stonehouse, and Plymouth, with a pop. of about 205,000. It has government dockyards and arsenal, and also ship-building yards, sail-cloth factories, potteries, soap and starch works, and flour and flax mills. Seat of Roman Catholic bishop. Pop. 112,030; increase 4.1 per cent.

Portsmouth, $50^{\circ} 48' \text{ N.}, 1^{\circ} 5' \text{ W.}$; seaport, co. bor., S. Hampshire, situated at the entrance of the spacious Portsmouth Harbour, in the middle of the English Channel, and close to the magnificent anchorage of Spithead, 74 m. SW. of London; is the largest naval station and the strongest fortified place in England. It has government dockyards and arsenal, and all its other industries are connected with the naval establishment. Seat of Roman Catholic bishop. The seaside resort of Southsea is included in the bor. Pop. 231,141; increase 22.3 per cent.

Preston, $53^{\circ} 45' \text{ N.}, 2^{\circ} 40' \text{ W.}$; co. bor., N. Lancashire, at the head of the estuary of the Ribble, 209 m. NW. of London; is a centre of the cotton industry. There are also iron foundries, ship-building yards, and mfrs. of machinery, electric cars, and equipment for electric cars. Pop. 117,088; increase 3.6 per cent.

Reading, $51^{\circ} 27' \text{ N.}, 0^{\circ} 59' \text{ W.}$; co. town of Berks, on river Kennet, near

its confluence with the Thames, 36 m. W. of London; is the centre of a large agricultural district, and has mfrs. of biscuits, agricultural implements, engines, electric-light supplies, flour, rope, sacks, brushes, and bricks, together with seed establishments, and breweries. Pop. 75,198; increase 4·1 per cent.

Rochdale, 53° 36' N., 2° 10' W.; co. bor., SE. Lancashire, on river Roch, 196 m. NNW. of London; has large mfrs. of cottons and woollens, also of machinery, paper, and iron foundries; extensive collieries and stone quarries in the vicinity. Pop. 97,428; increase 10·0 per cent.

Rochester, 51° 22' N., 0° 30' E.; port, episcopal city, Kent, on river Medway, 31 m. ESE. of London, contiguous with Chatham and Strood. These three towns possess large military and naval establishments, oil mills, and mfrs. of agricultural implements, steam engines, bricks, and cement. Pop. 31,384; increase 2·6 per cent.

St. Helens, 53° 27' N., 2° 44' W.; co. bor., SW. Lancashire, 102 m. NW. of London; is the principal seat of the mfr. of plate, crown, and sheet glass, and glass bottles; has also large copper-smelting works, iron and brass foundries, potteries, and mfrs. of alkali, chemicals, and patent medicines; collieries in the vicinity. Pop. 90,551, increase 14·4 per cent.

Salford, 53° 29' N., 2° 17' W.; co. bor., SE. Lancashire, on W. side of river Irwell, 190 m. NW. of London; forms with Manchester practically one town, and is a centre of the cotton industry. Seat of Roman Catholic bishop. Pop. 231,357; increase 4·7 per cent.

Salisbury, 51° 4' N., 1° 48' W.; co. town of Wiltshire, episcopal city, beautifully situated at the confluence of the Avon with the Bourne and Wiley, 84 m. W. by S. of London; has large trade in agricultural produce and cattle. Pop. 21,217; increase 5·1 per cent.

Sheffield, 53° 23' N., 1° 30' W.; co. bor., W. Riding of Yorkshire, picturesquely situated in an amphitheatre of hills, traversed by the river Don, 158 m. NNW. of London; is famous for its mfr. of cutlery. It has mfrs. of almost every description connected with iron, steel, and brass, including armour-plate for warships, mfrs. of silver and electro-plated goods, and optical instruments; coal abounds in the vicinity. Seat of a university and of a bishop. Pop. 454,632; increase 11·1 per cent.

Shrewsbury, 52° 45' N., 2° 44' W.; co. town of Salop (Shropshire), on river Severn, 162 m. NW. of London; has iron foundries, manufactures of tobacco and agricultural implements, and breweries. Seat of Roman Catholic bishop. Pop. 29,389; increase 3·5 per cent.

Southampton, 50° 54' N., 1° 24' W.; seaport, co. bor., Hants, at the head of Southampton Water, occupying a peninsula between the mouths of the Test and Itchen rivers, 78 m. SW. of London; is the principal port of call in the south for mail steamers to all parts of the world. Has yacht-building yards, also ship-building and marine engine works. Pop. 119,012; increase 13·5 per cent.

Stafford, 52° 49' N., 2° 7' W.; co. town of Staffordshire, on river Sow, 134 m. NW. of London; has mfrs. of boots and shoes, iron foundries, engineering works, and salt works. Pop. 23,383; increase 11·9 per cent.

Stockport, 53° 25' N., 2° 10' W.; co. bor., E. Cheshire, picturesquely situated on the slopes of a narrow valley where the Tame and the Goyt unite to form the Mersey, 178 m. NW. of London; is a centre of the cotton industry. It is also important for the felt-hat mfr., and has iron and brass

foundries, engine and machine shops, breweries and brick works. Pop. 108,682; increase 17·1 per cent.

Stoke-on-Trent, 53° 1' N., 2° 12' W.; co. bor., Staffordshire, on river Trent, 146 m. NW. of London; is the principal seat of the china, porcelain, and earthenware mfrs.; encaustic tiles and tessellated pavements are very extensively made; has also collieries and iron works. Pop. 234,534; increase 9·2 per cent.

Sunderland, 54° 54' N., 1° 23' W.; seaport, co. bor., Durham, at mouth of river Wear, 261 m. N. of London; is one of the largest coal-shipping ports in the kingdom, and has ship-building yards, marine engineering works, iron works, and mfrs. of rope, glass, and earthenwares. Pop. 151,159; increase 3·5 per cent.

Swansea, 51° 37' N., 3° 56' W.; seaport, co. bor., Glamorganshire, at the mouth of the Tawe, 193 m. W. of London; is the chief seat of the copper and tin-plate industry. Has smelting and refining works of copper, gold, silver, and calcium; mfrs. of iron, zinc, chemicals, patent fuel and alkali, and flour mills; abundant supply of coal in the vicinity. Pop. 114,663; increase 21·3 per cent.

Walsall, 52° 35' N., 1° 58' W.; co. bor., Staffordshire, on the river Tame, 120 m. NW. of London, situated on the northern edge of the Black Country; has mfrs. of saddlery, leather works, harness, hardware, tanneries, and iron and brass foundries; collieries and limestone quarries in the vicinity. Pop. 92,115; increase 6·6 per cent.

West Hartlepool, 54° 41' N., 1° 12' W.; seaport, co. bor., Durham, situated on the estuary of the Tees, 247 m. NW. of London; has ship-building yards, marine engine works, steel and iron plate-rolling mills, blast furnaces, saw mills, and cement works; large imports of timber and iron ore. Pop. 63,923; increase 2·1 per cent.

Wigan, 53° 32' N., 2° 38' W., co. bor.; SW. Lancashire, situated on the river Douglas, which flows into the estuary of the Ribble, 194 m. NNW. of London; has cotton mills, iron-works, and mfrs. of machinery and railway plant; numerous collieries. Pop. 89,152; increase 8·2 per cent.

Winchester, 51° 3' N., 1° 19' W.; co. town of Hampshire, episcopal city, situated on river Itchen, 67 m. WSW. of London; is famous as an educational centre. Pop. 23,378; increase 11·7 per cent.

Windsor, 51° 28' N., 0° 35' W.; Berkshire, on river Thames, 21 m. W. of London; is famous for its castle, which is the principal royal residence in the kingdom. Pop. 15,370; increase 7·7 per cent.

Wolverhampton, 52° 37' N., 2° 7' W.; co. bor., Staffordshire, the 'metropolis of the Black Country', 123 m. NW. of London; has blast furnaces, iron foundries, and rolling mills, where every description of iron and steel goods are made; specially famous for locks, tools, cycles, electro-plated and enamelled hollow wares. Pop. 95,328; increase 1·2 per cent.

Worcester, 52° 11' N., 2° 14' W.; co. town of Worcestershire, episcopal city, on the Severn, 113 m. WNW. of London; is a chief seat of the mfr. of gloves and porcelain; has also mfrs. of vinegar, chemicals, and sauce, railway signal works, and iron foundries. Pop. 47,982; increase 2·9 per cent.

Yarmouth, 52° 36' N., 1° 43' E.; seaport, co. bor., Norfolk, at mouth of river Yare, 121 m. NE. of London; is the chief seat of the herring and mackerel fisheries, and a popular watering-place. Pop. 55,905; increase 8·9 per cent.

York, 53° 56' N., 1° 5' W.; co. town of Yorkshire, the seat of an arch-

bishop, pleasantly situated at the confluence of the river Foss with the Ouse, 188 m. N. of London; has mfrs. of glass, flour, cocoa, leather, artificial manure, and iron foundries. Pop. 82,282; increase 5.6 per cent.

SCOTLAND

Aberdeen, 57° 8' N., 2° 5' W.; seaport, co. town of Aberdeenshire, situated on a bay on the North Sea, between the mouths of the Dee and the Don, 130 m. N. of Edinburgh; has ship-building yards, iron foundries, engineering works, paper mills, flax spinning, jute, jam and pickle factories, distilleries, tanneries, and the largest granite polishing works in the kingdom; extensive grey granite quarries in the vicinity; deep-sea fishing port. Seat of a university and of Protestant and Roman Catholic bishops. Pop. 163,891; increase 6.8 per cent.

Ayr, 55° 28' N., 4° 38' W.; seaport, co. town of Ayrshire, at mouth of river Ayr, 87 m. SW. of Edinburgh; has mfrs. of carpets, woollens, flannel, blankets, lace, boots and shoes, leather, foundries, engineering work, and saw mills; important sea fisheries. Pop. 32,085; increase 14.9 per cent.

Dumbarton, 55° 57' N., 4° 34' W.; seaport, co. town of Dumbartonshire, situated near the confluence of the Leven and the Clyde, 63 m. W. of Edinburgh; has ship-building yards, engineering works, iron foundries, and rope-making works. Pop. 22,310; increase 10.5 per cent.

Dumfries, 55° 4' N., 3° 36' W.; port, co. town of Dumfriesshire, beautifully situated on the river Nith, 90 m. S. by W. of Edinburgh; has mfrs. of tweeds, hosiery, hats, clogs, baskets, iron foundries, and tanneries. Pop. 10,062; increase 3.5 per cent.

Dundee, 56° 27' N., 2° 50' W.; seaport, Forfarshire, on the Firth of Tay, 59 m. NNE. of Edinburgh; is the chief seat of the jute industry, and of the manufacture of coarse linen, such as drills, ducks, canvas, sheetings and sackings, and ropes. It is also noted for its confectionery and preserves, especially marmalade; and has ship-building yards, engineering works, flour mills, tanneries, and breweries. Pop. 165,000; increase 1.2 per cent.

Edinburgh, 55° 57' N., 3° 11' W.; capital of Scotland, co. town of Edinburghshire, picturesquely situated on a series of ridges, and surrounded by lofty hills, on south shore of Firth of Forth, 305 m. NNW. of London; is one of the most beautiful cities in the United Kingdom. It is a great publishing centre, with its attendant industries of printing, lithographing, engraving, &c., and has paper mills, distilleries, tanneries, and seed nurseries. Seat of a university, and of a Protestant bishop and Roman Catholic archbishop. Pop. 320,766; increase 0.9 per cent.

Elgin, 57° 39' N., 3° 19' W.; co. town of Elginshire, beautifully situated on the Lossie, 178 m. N. of Edinburgh; is the trading centre of one of the most fertile districts of Scotland, called the 'Garden of Scotland', and has mfrs. of tweeds and woollens, distilling, brewing, tanning, and flour mills. Pop. 8,656; increase 3.0 per cent.

Falkirk, 56° 0' N., 3° 48' W.; Stirlingshire, 26 m. WNW. of Edinburgh, 3 m. from its port, Grangemouth, situated in a district rich in coal and iron; is the chief seat of the light casting trade in Scotland; has also mfrs. of explosives, chemicals, and brewing, distilling, and tanning. Pop. 33,574; increase 14.7 per cent.

Forfar, 56° 39' N., 2° 53' W.; co. town of Forfarshire, situated at the east end of the Loch of Forfar in the valley of Strathmore, 80 m. NE. of

Edinburgh; has jute and linen mfrs., especially of the coarser varieties. Pop. 10,849; decrease 4·8 per cent.

Glasgow, 55° 52' N., 4° 17' W.; seaport, Lanarkshire, the industrial and commercial metropolis of Scotland, on the river Clyde, 47 m. WSW. of Edinburgh; is situated near the richest field of coal and iron ore in Scotland. Has ship-building yards, iron and steel foundries, locomotive and marine engine works, engineering works producing all kinds of machinery, mfrs. of cottons, carpets, and lace curtains, bleaching, dyeing, and calico-printing works, distilleries, paper mills, and various chemical works. Seat of a university, and of a Protestant bishop and Roman Catholic archbishop. Pop. 784,459; increase 1·1 per cent.

Greenock, 55° 56' N., 4° 48' W.; seaport, Renfrewshire, on S. side of Firth of Clyde, 22 m. NW. of Glasgow; has ship-building yards, sugar refineries, engineering works, and woollen and worsted mills. Pop. 75,140; increase 9·0 per cent.

Inverness, 57° 28' N., 4° 13' W.; seaport, co. town of Inverness-shire, situated on the Ness, near its mouth in the Moray Firth, and on the Caledonian Canal, 190 m. NNW. of Edinburgh; has mfrs. of woollens, iron foundries, railway workshops, breweries, and distilleries. It is considered the capital of the Highlands, and is a favourite tourist resort. Seat of a bishop. Pop. 22,216; decrease 3·7 per cent.

Kirkcaldy, 56° 7' N., 3° 9' W.; seaport, Fifeshire, on the Firth of Forth, 26 m. N. of Edinburgh; is the chief seat of the floor-cloth and lineoleum industry, and has mfrs. of linen, cloth, marine engines, flax-spinning works, iron foundries, tanneries, and potteries. Pop. 39,600; increase 16·2 per cent.

Leith, 55° 58' N., 3° 10' W.; seaport, Edinburghshire, on the south shore of the Firth of Forth, 1½ m. NNE. of Edinburgh, of which it is the port and with which it is connected by a continuous street; has ship-building yards, engineering works, flour and saw mills, sugar refineries, distilleries, chemical works, and rope works. Pop. 80,489; increase 3·9 per cent.

Paisley, 55° 51' N., 4° 26' W.; Renfrewshire, situated on the White Cart, 3 m. above its confluence with the Clyde, 7 m. W. by S. of Glasgow; is the chief centre of the cotton-thread mfr., and has bleaching, dyeing, and calico printing, engineering works, potteries, distilleries, and mfrs. of corn-flour, starch, preserves, soap, and chemicals. Pop. 84,477; increase 6·4 per cent.

Peebles, 55° 39' N., 3° 11' W.; co. town of Peeblesshire, beautifully situated at the junction of Eddleston Water with the Tweed, sheltered by lofty hills, 27 m. S. of Edinburgh; has manufactures of woollens and tweeds, and flour mills. Pop. 5,554; increase 5·5 per cent.

Perth, 56° 24' N., 3° 27' W.; port, co. town of Perthshire, beautifully situated on river Tay, 48 m. N. of Edinburgh; is famous for its bleaching and dyeing works, and has mfrs. of ink, gauge-glasses, linen, carpets, floor-cloth, rope, and chemicals. Seat of a bishop. Pop. 35,851; increase 5·5 per cent.

Port Glasgow, 55° 56' N., 4° 41' W.; seaport, Renfrewshire, on the Firth of Clyde, 20 m. WNW. of Glasgow; has ship-building yards, iron and brass foundries, and engineering works. Pop. 17,775; increase 5·3 per cent.

Renfrew, 55° 53' N., 4° 24' W.; co. town of Renfrewshire, on the Clyde, 7 m. W. by N. of Glasgow; has ship-building yards and weaving mills. Pop. 12,565; increase 35·2 per cent.

Selkirk, 55° 33' N., 2° 51' W.; co. town of Selkirkshire, picturesquely

situated on an eminence that flanks the right bank of Ettrick Water, 40 m. SSE. of Edinburgh; has mfrs. of tweeds, tartans, and shawls. Pop. 5,046; increase 4·4 per cent.

Stirling, $56^{\circ} 7' \text{ N.}, 3^{\circ} 56' \text{ W.}$; co. town of Stirlingshire, on the river Forth, 39 m. NW. of Edinburgh; has mfrs. of tweeds, tartans, carpets, and agricultural implements. Pop. 21,200; increase 15·2 per cent.

IRELAND

Belfast, $54^{\circ} 36' \text{ N.}, 5^{\circ} 56' \text{ W.}$; seaport, with a safe and extensive harbour, co. town of Co. Antrim, capital of the Province of Ulster, situated at the entrance of river Lagan into Belfast Lough, 113 m. N. of Dublin; is the chief industrial and commercial city of Ireland. It is the centre of the linen industry, has extensive ship-building yards, numerous distilleries, large mfrs. of tobacco, rope, and sail-cloth, flour and oil mills, and factories for bacon-curing and mineral waters. Seat of a university, and of Protestant and Roman Catholic bishops. Pop. 386,947; increase 10·8 per cent.

Clonmel, $52^{\circ} 22' \text{ N.}, 7^{\circ} 42' \text{ W.}$; co. town of Co. Tipperary, 112 m. S.W. of Dublin, situated on both banks of the Suir, and on two islands, connected by bridges with the mainland; is, on account of the beauty of its situation and surroundings, a tourist centre. Has breweries, tanneries, flour mills, and trade in butter. Pop. 10,209; increase 1·1 per cent.

Cork, $51^{\circ} 53' \text{ N.}, 8^{\circ} 28' \text{ W.}$; seaport, co. town of Co. Cork, situated at the head of the magnificent inlet of Cork Harbour, on the river Lee, 105 m. S.W. of Dublin; has mfrs. of woollens, friezes, tweeds, brewing, distilling, bacon-curing, and tanneries, and exports of agricultural produce, especially butter. On one of the islands in the estuary of the Lee is situated the port of Queenstown. Seat of Protestant and Roman Catholic bishops. Pop. 76,073; increase 0·7 per cent.

Drogheda, $53^{\circ} 42' \text{ N.}, 6^{\circ} 21' \text{ W.}$; seaport, Co. Louth, on river Boyne, 4 m. from its mouth, into Drogheda Bay, 32 m. N. of Dublin; has mfrs. of cottons, linen, soap, manures, saw mills, tanneries, breweries, engineering works, and salt works, and trade in agricultural produce; valuable salmon fisheries. Pop. 12,425; decrease 2·6 per cent.

Dublin, $53^{\circ} 20' \text{ N.}, 6^{\circ} 17' \text{ W.}$; capital of Ireland, seaport, co. town of Co. Dublin, situated near the mouth of river Liffey, on Dublin Bay, 334 m. WNW. of London by the Holyhead route; has mfrs. of poplin, whisky, porter, agricultural implements, iron foundries, and some ship-building, and exports of agricultural produce. Seat of a university and of Protestant and Roman Catholic archbishops. Pop. 304,802; increase 4·0 per cent.

Kilkenny, $52^{\circ} 39' \text{ N.}, 7^{\circ} 16' \text{ W.}$; co. town of Co. Kilkenny, beautifully situated on river Nore, 81 m. SW. of Dublin; is the centre of collieries and marble quarries, and has mills for cutting and polishing marble, as well as corn mills, breweries, and tanneries. Seat of Protestant and Roman Catholic bishops. Pop. 10,514; decrease 0·9 per cent.

Limerick, $52^{\circ} 40' \text{ N.}, 8^{\circ} 35' \text{ W.}$; seaport, co. town of Co. Limerick, beautifully situated on the Shannon, at the head of its estuary, 129 m. WSW. of Dublin; has factories for agricultural implements, manures, bacon-curing, condensed milk, and creameries; important salmon fishery. Seat of Protestant and Roman Catholic bishops. Pop. 38,518; increase 1·0 per cent.

Londonderry, or Derry, $55^{\circ} 1' \text{ N.}, 7^{\circ} 22' \text{ W.}$; seaport, co. town of Co. Londonderry, situated on a hill overlooking the river Foyle, 4 m. above its junction

with Lough Foyle, 163 m. NNW. of Dublin; has shirt-making factories, ship-building yards, iron foundries, flour and saw mills, tobacco factories, breweries, and distilleries; valuable salmon fisheries. Seat of Protestant and Roman Catholic bishops. Pop. 40,780; increase 2·2 per cent.

Sligo, 54° 16' N., 8° 27' W.; seaport, co. town of Co. Sligo, beautifully situated at the mouth of river Garvogue, 134 m. NW. of Dublin; has breweries, flour and saw mills, and exports of agricultural produce; head-quarters of salmon and sea fisheries. Pop. 11,163; increase 2·7 per cent.

Waterford, 52° 16' N., 7° 6' W.; seaport, co. town of Co. Waterford, beautifully situated on river Suir, at the head of its tidal estuary called Waterford Harbour, 111 m. SSW. of Dublin; has flour mills, salt works, breweries, and foundries; and large trade in agricultural produce and live stock; head-quarters of salmon and sea fisheries. Seat of Protestant and Roman Catholic bishops. Pop. 27,464; increase 2·6 per cent.

Wexford, 52° 20' N., 6° 28' W.; seaport, co. town of Co. Wexford, beautifully situated at the mouth of river Slaney, on Wexford Harbour, 93 m. S. of Dublin; has mfrs. of agricultural implements, rope, cement, leather, whisky, and flour, and large exports of agricultural produce; salmon, oyster, and sea fisheries. Pop. 11,531; increase 2·8 per cent.

NOTE TO STATISTICS IN FOLLOWING PAGES

[The figures for trade, &c., of the United Kingdom in great part represent averages for the period 1907–11, and thus preserve uniformity of treatment with that employed in other volumes. They may be supplemented for other years (1912, &c.) from Chapter VIII.]

STATISTICS •

BY HAROLD MACFARLANE

[NOTE.—H. Y. = highest year during period of averages.]

THE UNITED KINGDOM

POPULATION

	<i>U.K.*</i> 1,000.	<i>England,</i> 1,000.	<i>Wales,</i> 1,000.	<i>Scotland,</i> 1,000.	<i>Ireland,</i> 1,000.
1881	34,884.8	24,014.0	1,300.4	3, 33.5	8,174.8
1891	37,732.9	27,489.2	1,513.3	4,025.9	10,704.7
1901	41,458.7	30,813.0	1,714.8	4,472.1	14,458.7
1911	45,221.6	34,045.3	2,025.2	4,700.9	14,390.2

* Excluding the islands in the British seas

INCREASE OR DECREASE PER CENT. IN EACH INTERCENSAL PERIOD

	<i>U.K.</i>	<i>England,</i>	<i>Wales,</i>	<i>Scotland,</i>	<i>Ireland,</i>
1881	+ 10.8	+ 13.5	+ 11.8	+ 11.2	4.4
1891	+ 8.2	+ 11.7	+ 11.7	+ 7.8	9.1
1901	+ 9.9	+ 12.1	+ 13.3	+ 11.1	8.2
1911	+ 9.1	+ 10.5	+ 18.1	+ 6.5	1.54

POPULATION ACCORDING TO SEX (NO. OF FEMALES TO 1,000 MALES)

	ENG. AND WALES.	SCOTLAND.	IRELAND.
1881	1,055	1,075	1,042
1891	1,064	1,072	1,028
1901	1,068	1,057	1,020
1911	1,068	1,062	1,002

ISLE OF MAN :	<i>Total</i> <i>pop.</i>	<i>Males,</i> 1,000.	<i>Females,</i> 1,000.	<i>Inc. or dec. %</i> <i>in intercensal</i> <i>period.</i>
1881	53,558	25.7	27.8	- 0.9
1891	55,908	26.3	29.3	+ 3.8
1901	54,752	25.5	29.2	1.5
1911	52,016	23.9	28.1	- 5.9

No. of females per 1,000 males, 1,17.3.

CHANNEL ISLANDS, *Jersey* :

1881	52,445	23.5	28.9	- 7.4
1891	54,518	25.0	29.5	+ 4.0
1901	52,576	23.9	28.6	- 3.6
1911	51,898	24.0	27.88	- 1.3

No. of females per 1,000 males, 1,161.

Guernsey, and adjacent Islands :

1881	35,257	16.8	18.4	+ 3.8
1891	37,716	18.26	19.45	+ 7.0
1901	43,042	21.1	21.9	+ 14.1
1911	45,001	22.2	22.8	+ 4.6

No. of females per 1,000 males, 1,026.

TOTAL—ISLANDS IN THE BRITISH SEAS :

	<i>Total pop.</i>	<i>Males. 1,000.</i>	<i>Females 1,000.</i>	<i>Inc. or dec. % in intercensal period.</i>
1881	141,260	66·9	75·0	- 2·3
1891	147,842	69·5	78·0	+ 4·7
1901	150,370	70·6	79·8	+ 1·7
1911	148,915	70·16	78·75	- 1·0

No. of females per 1,000 males, 1,128.

	URBAN POPULATION		RURAL POPULATION	
	1,000.	% of total.	1,000.	% of total.
England and Wales	28,169	78·1	7,906	21·9
	BURGH POPULATION		EXTRA-BURGHAL	
Scotland	3,140	65·98	1,620	34·02
	CIVIC POPULATION *		RURAL	
Ireland	1,470·6	33·49	2,919·6	66·51

* Towns of 2,000 inhabitants or more.

ENGLAND AND WALES

<i>Admin. Counties and County Boroughs.</i>	<i>Area (land and inland water). 1,000 ac.</i>	<i>Persons.</i>	1911.		<i>Inc. or dec. %.</i>
			<i>Males. 1,000.</i>	<i>Females. 1,000.</i>	<i>1901-11</i>
1. England and Wales	37,337·5	36,070,492	17,445·6	18,624·9	+ 10·9
2. 62 Admin. Counties	36,820·2	25,200,520	12,234·0	12,966·5	+ 11·8
3. 75 County Boroughs	517·3	10,869,972	5,211·6	5,658·4	+ 8·9
4. Bedfordshire (A.C.)	302·9	194,588	93·0	101·6	+ 13·3
5. Berkshire (A.C.)	456·5	195,811	95·6	100·2	+ 8·6
Reading (C.B.)	5·8	75,198	36·2	39·0	+ 4·1
Total Berkshire	462·3	271,009	131·8	139·2	+ 7·3
6. Buckinghamshire (A.C.)	479·3	219,551	107·3	112·2	+ 11·4
7. Cambridgeshire (A.C.)	315·1	128,322	61·7	66·6	+ 6·7
Isle of Ely (A.C.)	238·0	69,752	35·2	34·5	+ 8·2
Total Cambridgeshire	553·2	198,074	96·9	101·1	+ 7·2
8. Cheshire (A.C.)	644·2	676,275	321·8	354·5	+ 13·9
Birkenhead (C.B.)	3·8	130,794	63·6	67·2	+ 17·9
Chester (C.B.)	2·8	39,028	18·4	20·6	+ 1·9
Stockport (C.B.)	5·5	108,682	50·9	57·7	+ 17·1
Total Cheshire	656·3	954,779	454·7	500·0	+ 14·2
9. Cornwall (A.C.)	868·1	328,098	151·6	176·5	+ 1·8
10. Cumberland (A.C.)	973·0	265,746	129·8	135·9	- 0·4
11. Derbyshire (A.C.)	645·1	560,013	283·0	277·0	+ 15·5
Derby (C.B.)	5·2	123,410	60·0	63·4	+ 7·5
Total Derbyshire	650·3	683,423	343·0	340·4	+ 14·0
12. Devonshire (A.C.)	1,662·7	457,331	214·3	243·0	+ 4·7
Devonport (C.B.)	3·1	81,678	44·4	37·2	+ 16·0
Exeter (C.B.)	3·1	48,664	22·4	26·2	+ 3·1
Plymouth (C.B.)	2·4	112,030	51·7	60·3	+ 4·1
Total Devonshire	1,671·3	699,703	332·8	366·9	+ 5·7
13. Dorsetshire (A.C.)	625·6	223,266	110·8	112·4	+ 10·5

BRITISH ISLES

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<i>Admin. Counties and County Boroughs.</i>	<i>Area (land and inland water).</i>		1911.		<i>Inc. or dec. % 1901-11</i>
	<i>1,000 ac.</i>	<i>Persons.</i>	<i>Males. 1,000.</i>	<i>Females. 1,000.</i>	
14. Durham (A.C.)	637.7	929,214	475.2	454.0	+ 21.0
Gateshead (C.B.)	3.1	116,917	57.8	59.1	+ 6.4
South Shields (C.B.)	2.4	108,647	53.3	55.3	+ 7.7
Sunderland (C.B.)	3.3	151,159	72.5	78.6	+ 3.5
West Hartlepool (C.B.)	2.7	63,023	31.5	32.4	+ 2.1
Total Durham	649.2	1,309,860	600.4	679.4	+ 15.4
15. Essex (A.C.)	974.8	1,061,851	517.9	543.9	+ 30.0
West Ham (C.B.)	4.7	289,030	142.7	146.3	+ 8.1
Total Essex	979.5	1,350,881	660.6	690.2	+ 24.6
16. Gloucester (A.C.)	780.0	320,014	156.3	172.7	+ 2.4
City of Bristol (C.B.)	17.4	357,048	163.6	193.4	+ 5.3
City of Gloucester (C.B.)	2.3	50,035	23.7	29.3	+ 4.3
Total Gloucestershire	805.8	730,097	343.6	395.5	3.0
17. Hampshire :					
Southampton (A.C.)	94.25	433,506	223.6	208.0	+ 19.2
Isle of Wight (A.C.)	94.1	88,186	41.4	40.7	+ 7.0
Bournemouth (C.B.)	5.7	78,624	39.5	48.1	+ 31.6
Portsmouth (C.B.)	6.1	231,341	113.1	119.0	+ 22.3
Southampton (C.B.)	4.6	110,012	57.4	61.9	+ 13.5
Total Hampshire	1,053.0	950,579	479.0	489.5	+ 18.0
18. Herefordshire (A.C.)	538.9	114,269	55.1	59.1	+ 0.1
19. Hertfordshire (A.C.)	494.5	311,284	148.6	162.6	+ 20.5
20. Huntingdonshire (A.C.)	233.9	55,577	27.5	28.0	+ 2.7
21. Kent (A.C.)	972.0	1,020,065	495.1	525.8	+ 9.0
Canterbury (C.B.)	3.9	24,626	11.7	12.9	+ 1.1
Total Kent	975.9	1,045,591	506.8	538.7	+ 8.8
22. Lancashire (A.C.)	1,000.5	1,739,320	835.7	903.6	+ 10.2
Barrow in Furness (C.B.)	11.0	63,770	33.3	39.4	+ 10.7
Blackburn (C.B.)	7.4	133,052	61.8	71.2	+ 3.0
Blackpool (C.B.)	3.6	58,371	25.4	32.9	+ 23.3
Bolton (C.B.)	15.2	180,851	85.1	95.7	+ 7.5
Bootle (C.B.)	1.9	69,876	34.4	35.4	+ 16.0
Burnley (C.B.)	4.9	106,322	50.2	59.1	+ 9.6
Bury (C.B.)	5.9	58,648	27.7	30.9	+ 1.1
Liverpool (C.B.)	10.6	746,421	358.1	388.3	+ 6.9
Manchester (C.B.)	21.6	714,333	343.3	379.9	+ 10.8
Oldham (C.B.)	4.7	147,483	70.6	76.8	+ 7.5
Preston (C.B.)	3.9	117,088	53.9	63.1	+ 3.6
Rochdale (C.B.)	6.4	91,428	42.6	48.8	+ 10.9
St. Helens (C.B.)	7.2	99,551	50.3	46.2	+ 14.4
Salford (C.B.)	5.2	231,357	110.6	119.7	+ 4.7
Southport (C.B.)	5.1	51,643	21.1	30.5	+ 7.3
Warrington (C.B.)	3.0	72,166	36.3	35.8	+ 12.3
Wigan (C.B.)	5.0	89,152	43.9	45.5	+ 8.2
Total Lancashire	1,194.9	4,797,832	2,285.5	2,482.3	+ 8.9
23. Leicestershire (A.C.)	524.2	249,331	122.4	126.9	+ 10.4
Leicester (C.B.)	8.5	227,222	105.9	121.3	+ 7.4
Total Leicestershire	532.7	476,553	228.3	248.2	+ 8.5

<i>Admin. Counties and County Boroughs.</i>	<i>Area (land and inland water). 1,000 ac.</i>	<i>Persons.</i>	<i>1911. Males. 1,000.</i>	<i>Females. 1,000.</i>	<i>Inc. or dec. %. 1901-11.</i>
24. Lincolnshire :					
Holland (A.C.) . . .	269.0	82,849	40.9	41.9	+ 6.8
Kesteven (A.C.) . . .	465.8	111,324	55.5	55.8	+ 7.1
Lindsey (A.C.) . . .	963.8	237,843	118.7	119.1	+ 15.2
Grimsby (C.B.) . . .	2.8	74,659	37.6	37.0	+ 18.2
City of Lincoln (C.B.) . . .	3.7	57,285	28.5	28.7	+ 17.4
Total Lincolnshire . . .	1,705.3	563,960	281.2	282.7	+ 12.8
25. London . . .	74.8	4,521,685	2,126.3	2,395.3	- 0.3
26. Middlesex (A.C.) . . .	148.7	1,126,465	525.4	601.0	+ 42.1
27. Monmouthshire (A.C.) . . .	345.0	312,028	165.2	146.8	+ 35.2
Newport (C.B.) . . .	4.5	83,691	42.1	41.5	+ 24.4
Total Monmouthshire . . .	349.5	395,719	207.4	188.3	+ 32.8
28. Norfolk (A.C.) . . .	1,303.5	321,733	159.4	162.3	+ 3.3
Great Yarmouth (C.B.) . . .	3.6	55,995	25.6	30.3	+ 8.9
Norwich (C.B.) . . .	7.9	121,478	56.1	65.3	+ 6.6
Total Norfolk . . .	1,315.0	499,116	241.1	257.9	+ 4.7
29. Northamptonshire (A.C.) . . .	581.6	213,733	106.2	107.5	+ 3.0
Soke of Peterboro' (A.C.) . . .	53.5	44,718	21.7	23.0	+ 8.7
Northampton (C.B.) . . .	3.5	90,064	42.9	47.1	+ 3.5
Total Northamptonshire . . .	638.6	348,515	170.8	177.7	+ 3.8
30. Northumberland (A.C.) . . .	1,278.7	371,474	186.5	184.9	+ 21.9
Newcastle-on-Tyne (C.B.) . . .	8.4	266,603	131.2	135.4	+ 7.9
Tynemouth (C.B.) . . .	4.4	58,816	29.0	29.8	+ 14.5
Total Northumberland . . .	1,291.5	696,893	346.7	350.1	+ 15.5
31. Nottinghamshire (A.C.) . . .	529.2	344,194	171.3	172.8	+ 25.3
Nottingham (C.B.) . . .	10.9	259,904	120.4	139.5	+ 8.4
Total Nottingham . . .	540.1	604,098	291.7	312.3	+ 17.4
32. Oxfordshire (A.C.) . . .	475.9	146,221	71.5	74.7	+ 6.6
Oxford (C.B.) . . .	4.7	53,048	23.4	29.6	+ 7.5
Total Oxfordshire . . .	480.6	199,269	94.9	104.3	+ 6.9
33. Rutland (A.C.) . . .	97.2	20,346	10.3	10.0	+ 3.2
34. Shropshire (A.C.) . . .	861.8	246,307	121.8	124.5	+ 2.7
35. Somersetshire (A.C.) . . .	1,034.2	407,304	192.0	215.3	+ 5.8
Bath (C.B.) . . .	3.4	50,721	20.7	30.0	+ 1.8
Total Somersetshire . . .	1,037.6	458,025	212.7	245.3	+ 5.3
36. Staffordshire (A.C.) . . .	710.8	738,990	369.1	369.8	+ 10.1
Burton-on-Trent (C.B.) . . .	4.2	48,266	24.2	24.0	- 4.2
Smethwick (C.B.) . . .	1.9	70,694	34.4	36.2	+ 29.6
Stoke-on-Trent (C.B.) . . .	11.1	234,534	114.7	119.8	+ 9.2
Walsall (C.B.) . . .	7.5	92,115	45.4	46.7	+ 6.6
West Bromwich (C.B.) . . .	5.9	68,332	34.3	33.9	+ 4.8
Wolverhampton (C.B.) . . .	3.5	95,328	46.4	48.9	+ 1.2
Total Staffordshire . . .	744.9	1,348,259	668.7	679.5	+ 9.0
37. Suffolk, East (A.C.) . . .	549.2	203,223	100.4	102.8	+ 7.4
Suffolk, West (A.C.) . . .	390.9	116,905	57.9	59.0	- 0.6
Ipswich (C.B.) . . .	8.1	73,932	35.0	38.9	+ 11.0
Total Suffolk . . .	948.2	394,060	193.3	200.7	+ 5.5

<i>Admin. Counties and County Boroughs.</i>	<i>Area (land and inland water). 1,000 ac.</i>	<i>Persons.</i>	<i>1911. Males. 1,000.</i>	<i>Females. 1,000.</i>	<i>Inc. or dec. %. 1901-11</i>
38. Surrey (A.C.)	452.8	676,027	313.3	362.7	+ 30.1
Croydon (C.B.)	9.0	169,551	77.0	92.5	+ 26.6
Total Surrey	461.8	845,578	390.3	455.2	+ 29.4
39. Sussex, East (A.C.)	517.1	242,146	110.7	131.4	+ 10.9
Sussex, West (A.C.)	401.8	176,308	83.3	93.0	+ 16.5
Brighton (C.B.)	2.5	131,237	58.4	72.8	+ 6.3
Eastbourne (C.B.)	6.5	52,542	21.8	30.7	+ 20.6
Hastings (C.B.)	4.5	61,145	25.0	36.1	- 6.7
Total Sussex	932.4	603,378	299.2	364.2	+ 10.1
40. Warwickshire (A.C.)	563.1	408,227	197.7	210.5	+ 17.4
City of Birmingham (C.B.)	13.5	525,833	253.7	272.1	+ 0.5
City of Coventry (C.B.)	4.1	106,349	54.2	52.1	+ 52.0
Total Warwickshire	580.7	1,040,409	505.7	534.7	+ 10.6
41. Westmorland (A.C.)	505.3	63,575	30.1	—	- 1.3
42. Wiltshire (A.C.)	864.1	286,822	143.1	143.7	+ 5.7
43. Worcestershire (A.C.)	472.5	427,026	203.2	223.8	+ 19.5
Dudley (C.B.)	3.5	51,079	25.0	26.0	+ 4.8
City of Worcester (C.B.)	3.2	47,982	22.2	25.7	+ 2.9
Total Worcestershire	479.2	526,087	250.4	275.6	+ 16.2
44. Yorkshire, E. Riding (A.C.)	741.2	154,768	75.8	78.9	+ 6.9
City of Kingston-on-Hull (C.B.)	9.0	277,691	136.0	141.9	+ 15.7
Total East Riding	750.2	432,759	211.8	220.9	+ 12.4
North Riding (A.C.)	1,359.6	314,770	155.3	159.4	+ 10.0
Middlesbrough (C.B.)	2.6	104,717	53.5	51.2	+ 14.7
Total North Riding	1,362.2	419,546	208.9	210.6	+ 11.2
West Riding (A.C.)	1,673.5	1,584,880	782.0	802.8	+ 14.1
City of Bradford (C.B.)	2.0	288,438	133.4	155.0	+ 3.1
Halifax (C.B.)	14.0	101,553	40.3	55.2	- 3.2
Huddersfield (C.B.)	11.8	107,821	50.0	57.8	+ 13.4
City of Leeds (C.B.)	21.6	445,550	211.7	233.8	+ 3.9
Rotherham (C.B.)	6.0	62,483	32.2	30.2	+ 15.0
City of Sheffield (C.B.)	23.6	454,632	224.3	230.3	+ 11.1
Total West Riding	1,773.5	3,045,377	1,480.1	1,565.2	+ 10.3
City of York (C.B.)	3.7	82,282	39.9	42.3	+ 5.6
45. Anglesey (A.C.)	176.6	50,928	24.0	26.3	+ 0.6
46. Brecknockshire (A.C.)	469.3	59,287	30.3	28.9	+ 9.4
47. Cardiganshire (A.C.)	443.2	59,879	26.9	32.9	- 2.0
48. Carmarthenshire (A.C.)	588.4	160,406	80.0	80.4	+ 18.5
49. Carnarvonshire (A.C.)	366.0	125,043	59.3	65.7	- 0.5
50. Denbighshire (A.C.)	426.0	144,783	72.2	72.5	+ 10.9
51. Flintshire (A.C.)	163.0	92,705	45.8	46.9	+ 13.8
52. Glamorganshire (A.C.)	489.5	742,098	391.5	351.4	+ 39.7
City of Cardiff (C.B.)	6.4	182,259	89.7	92.5	+ 10.9
Merthyr Tydfil (C.B.)	17.7	80,990	43.0	37.9	+ 17.0
Swansea (C.B.)	5.2	114,663	57.8	56.8	+ 21.3
Total Glamorganshire	518.8	1,120,910	582.2	538.7	+ 30.3
53. Merionethshire (A.C.)	422.3	45,565	21.8	23.7	- 6.7
54. Montgomeryshire (A.C.)	510.1	53,846	26.2	26.9	- 3.2
55. Pembrokeshire (A.C.)	393.0	89,960	43.4	46.5	+ 2.4
56. Radnorshire (A.C.)	301.1	22,590	11.3	12.2	- 3.0

POPULATION OF SCOTLAND

Divisions and Counties.	Area excl. of inland water and foreshore. 1,000 acres.	Population, 1911.		Total.	Inc. or dec. % 1901-11.
		Males. 1,000.	Females. 1,000.		
SCOTLAND	19,070·4	2,307·6	2,451·8	4,760,904	+ 6·5
I. Northern.					
Shetland	352·3	12·6	15·3	27,911	- 0·9
Orkney	240·8	12·2	13·6	25,897	- 9·8
Caithness	438·8	15·15	16·85	32,010	- 5·5
Sutherland	1,297·9	9·8	10·3	20,179	- 5·9
II. North-western.					
Ross and Cromarty	1,977·2	38·7	38·6	77,364	+ 1·2*
Inverness	2,695·0	42·4	44·8	87,272	- 3·1
III. North-eastern.					
Nairn	104·2	4·3	5·0	9,319	+ 0·3
Elgin (or Moray)	304·9	20·5	22·9	43,427	- 3·1
Banff	403·0	29·75	31·65	61,402	- 0·1
Aberdeen	1,261·5	147·35	164·8	312,177	+ 2·5
Kincairdine	244·4	19·75	21·25	41,008	+ 0·2
IV. East-midland.					
Forfar	559·0	126·6	154·8	281,417	- 0·9
Perth	1,595·8	58·3	66·0	124,342	+ 0·9
Fife	322·8	132·1	135·6	267,739	+ 22·3
Kinross	52·4	3·6	3·9	7,527	+ 7·8
Clackmannan	34·9	14·6	16·5	31,121	- 2·8
V. West-midland.					
Stirling	288·8	82·3	78·7	160,991	+ 13·1
Dumbarton	157·4	69·7	70·1	139,831	+ 22·8
Argyll	1,990·4	35·4	35·5	70,902	- 3·7*
Bute	139·6	8·0	10·1	18,186	- 3·2
VI. South-western.					
Renfrew	153·3	151·6	162·9	314,552	+ 16·9
Ayr	724·5	130·2	138·1	268,337	+ 5·5
Lanark	562·8	721·4	725·6	1,447,034	+ 8·0
VII. South-eastern.					
Linlithgow	76·8	42·7	37·4	80,155	+ 22·0*
Edinburgh	234·3	235·4	272·2	507,666	+ 3·9
Haddington	170·9	21·4	21·8	43,254	+ 11·9
Berwick	292·5	14·2	15·4	29,643	- 3·8
Peebles	222·2	7·0	8·2	15,258	+ 1·3
Selkirk	170·8	11·3	13·3	24,601	+ 5·3
VIII. Southern.					
Roxburgh	426·0	21·5	25·6	47,192	- 3·3
Dumfries	686·3	35·0	37·8	72,825	+ 0·4
Kirkcudbright	575·8	18·0	20·3	38,367	- 2·6
Wigtown	311·9	15·0	16·9	31,998	- 2·1

* Excluding Royal Navy, Argyll - 6·2 p.c., Linlithgow + 19·7 p.c., Ross and Cromarty - 4·0 p.c.

BRITISH ISLES

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CENSUS OF IRELAND FOR 1911

Province and Counties.	Area. 1000 ac.	Population, 1911.			Inc. or dec. %. 1901-11.
		Total.	Males. 1,000.	Females. 1,000.	
Leinster.					
Co. Carlow	221.5	36,252	18.5	17.7	-4.0
Dublin	226.8	477,196	220.3	250.8	+6.4
Kildare	418.6	66,627	37.7	28.9	+4.8
Kilkenny	509.5	74,962	38.5	36.4	-5.3
King's	493.3	56,832	29.8	27.0	-5.6
Longford	257.8	43,820	22.6	21.2	-6.1
Louth	202.2	63,665	32.2	31.4	-3.3
Meath	577.7	65,091	33.9	31.1	-3.6
Queen's	424.8	54,629	28.7	25.9	-4.9
Westmeath	434.7	59,986	31.9	28.0	-2.7
Wexford	580.9	102,273	51.5	50.7	-1.8
Wicklow	499.9	60,711	31.1	29.6	
Total	4,847.7¹	1,162,044	582.9	579.0	+0.8
Munster.					
Co. Clare	788.3	104,232	53.9	50.3	-7.2
Cork, County		315,431	161.2	154.2	-4.0
Cork, Co. Borough	843.7	70,673	36.3	40.3	-0.7
Kerry	1,161.7	159,691	81.5	78.2	-3.6
Limerick & Borough	663.9	143,000	72.2	70.8	-2.2
Tipperary, N.R.		62,881	32.3	30.5	
Tipperary, S.R.	1,051.3	80,552	46.2	43.3	-4.9
Waterford & Borough	454.5	83,966	42.4	41.5	-3.7
Total	5,903.5	1,035,495	520.1	509.3	-3.8
Ulster.					
Co. Antrim	702.6	103,864	93.6		1.1
Armagh	312.7	120,291	58.6	61.7	-4.1
Belfast Co. Borough	1.9	386,947	181.2	205.7	+10.8
Cavan	467.0	91,174	47.7	43.4	-6.5
Donegal	1,163.6	168,537	84.6	83.9	-3.0
Down	608.8	204,303	97.95	106.35	0.8
Fermanagh	417.0	60,836	31.7	30.1	-5.5
Londonderry	512.7	90,845	49.1		-4.5
Londonderry Co. Bor.	2.5	40,780	18.5		+2.2
Monaghan	318.0	71,455	35.9	35.5	-4.2
Tyrone	779.5	142,665	71.7	70.9	-5.3
Total	5,331.0¹	1,581,696	770.8	810.8	
Connaught.					
Co. Galway	1,467.8	182,224	94.4	87.8	-5.4
Leitrim	376.5	63,582	32.7	30.8	-6.3
Mayo	1,333.3	192,177	96.9	95.8	-3.5
Roscommon	608.3	93,956	48.5	45.4	-7.7
Sligo	442.2	79,045	40.0	38.9	-6.0
Total	4,228.2⁴	610,984	312.0	298.9	-5.6
Total of Ireland	20,371.1⁴	4,390,219	2,192.0	2,198.1	-1.54

¹ Exclu. of 46,402 ac. under the larger rivers, lakes, and tideways.

" " 137,086

" " 157,555

" " 146,249

" " 481,293

IRELAND. RELIGIONS, 1911

Roman Catholics, 3,242,690 (73·86% of total population); Protestant: Episcopalians, 576,611 (13·13%); Presbyterians, 440,525 (10·04%); Methodists, 62,382 (1·42%); all other denominations, 68,031 (1·55%).

AGRICULTURAL DISTRIBUTION OF AREAS OF THE UNITED KINGDOM (Av. 1908-12)

	<i>Area of land & water (exclus. of foreshore and tidal water).</i> 1,000 ac.	<i>Mountain & heath land used for grazing.</i> 1,000 ac.	<i>Permanent grass.</i> 1,000 ac.	<i>Arable land.</i> 1,000 ac.	<i>Woods and plantations.</i> 1,000 ac.
Great Britain	56,804	12,875	17,425	14,701	2,782
England	32,564	2,460	13,891	10,611	1,720
Wales	4,778	1,345	2,042	733	187
Scotland	19,462	9,070	1,492	3,357	875
Ireland	20,351	2,588	9,861	4,798	380
Isle of Man	141	28	18	75	1
Jersey	29	1	3	16	
Guernsey	16		6	5	

CHIEF CROPS (Av. 1908-12)

	<i>Av. yield.</i> 1,000 qrs.	<i>H. Y.</i>	<i>1,000 qrs.</i>	<i>Av. area.</i> 1,000 ac.	<i>Av. yield per ac. 1902-11.</i> Bushels.
WHEAT :					
England . . .	6,779	1911	7,359	1,725	31·83
Wales . . .	134	1909	139	58	27·17
Scotland . . .	272	1911	337	54	39·64
Ireland . . .	202	1909	219	43	36·05
United Kingdom.	7,387	1911	8,039	1,860	32·16
BARLEY :					
England . . .	5,665	1909	6,340	1,383	33·43
Wales . . .	338	1910	351	87	31·24
Scotland . . .	856	1909	936	191	35·65
Ireland . . .	880	1909	1,000	162	41·60
United Kingdom.	7,739	1909	8,618	1,823	34·24
OATS :					
England . . .	9,351	1908	9,994	1,873	42·27
Wales . . .	885	1910	971	203	35·27
Scotland . . .	4,583	1909	4,738	954	37·31
Ireland . . .	6,637	1909	6,964	1,051	47·97
United Kingdom.	21,456	1909	22,342	4,081	42·25
BEANS :					
England . . .	1,000·0	1909	1,070·0	281·0	30·18
Wales . . .	4·0	1910	4·9	1·2	27·12
Scotland . . .	42·0	1910	46·4	9·2	35·61
Ireland . . .	8·4	1910	9·7	1·7	42·30
United Kingdom.	1,054·4	1909	1,126·0	293·1	30·45
PEAS :					
England . . .	505·0	1909	546·0	157·0	27·31
Wales . . .	1·8	1908	2·1	0·66	22·18
Scotland . . .	2·0	1912	2·2	0·56	27·54
Ireland . . .	0·95	1911	1·05	0·27	28·04
United Kingdom.	509·75	1909	551·0	158·49	27·25

POTATOES *	<i>Av. yield</i> 1,000 tons.	<i>H. Y.</i>	1,000 tons.	<i>Av. area</i> 1,000 ac.	<i>Av. yield per</i> ac. 1902-11. Tons.
England . . .	2,523	1908	2,717	403	6.09
Wales . . .	147	1911	175	27	5.15
Scotland . . .	944	1908	1,048	143	6.41
Ireland . . .	3,103	1911	3,605	589	4.80
United Kingdom.	6,717	1911	7,520	1,162	5.44
TURNIPS AND SWEDES :					
England . . .	13,798	1909	16,543	1,051	13.31
Wales . . .	905	1910	1,000	58	15.5
Scotland . . .	7,549	1908	8,319	440	16.27
Ireland . . .	4,813	1908	5,417	275	17.0
United Kingdom.	27,065	1910	30,319	1,824	14.64
MANGOLDS :					
England . . .	8,599	1909	9,310	440.0	10.81
Wales . . .	204	1912	215	11.0	17.8
Scotland . . .	44	1912	49	2.3	3.1
Ireland . . .	1,504	1911	1,734	70.0	18.85
United Kingdom.	10,351	1909	11,012	520.3	19.63
HAY (all kinds) :					
	<i>Total.</i>	<i>From Perma- nent grass.</i>		<i>Av. yield per ac. 1902-11.</i>	
	1,000 tons.	1,000 tons.	<i>H. Y.</i>	1,000 tons.	1,000 acres.
England . . .	7,129	5,004	1908	8,016	5,748
Wales . . .	741	528	1910	820	713
Scotland . . .	890	230	1908	916	586
Ireland . . .	4,950	3,200	1910	5,778	2,399
Utd. Kgdm.	13,710	9,058	1910	15,294	9,446
				32.83	29.33

Hops. England, av. crop, 338,000 cwt.; highest year, 1908, 470,000 cwt.; acreage, 34,400; av. crop per ac., 1902-11, 8.68 cwt.

CABBAGE. Av. acreage, 1908-12: England, 148,000; Wales, 5,400; Scotland, 13,600; Ireland, 40,000.

SMALL FRUITS. Av. acreage: England, 76,600; Wales, 1,100; Scotland, 7,300; Ireland, 14,000.

FLAX. Av. acreage, Ireland, 50,500.

ORCHARDS. Av. acreage: England and Wales, 248,000; Scotland, 2,000.

LIVE STOCK. United Kingdom (av. 1908-12): horses, 2,000,000 (1912, 1,994,600); cattle, 11,809,000 (1912, 11,614,600); sheep, 30,756,800 (1912, 28,967,000); pigs, 3,880,600 (1912, 3,692,500).

Statistics of produce are not available for the Isle of Man and Channel Islands, but the average areas under various crops are as follows:

<i>Total acreage under</i>	<i>Isle of Man.</i> 1,000 acres.	<i>Jersey.</i> 1,000 acres.	<i>Guernsey.</i> 1,000 acres.
Crops and grass . . .	92.9	19.5	11.5
Arable land . . .	74.9	16.1	5.5
Permanent grass . . .	18.0	3.4	6.0
Wheat . . .	0.5	0.65	0.2
Barley . . .	2.5	0.14	0.12
Oats . . .	19.3	1.14	0.65
Total corn crops . . .	22.5	1.95	1.05
Potatoes . . .	2.5	8.8	0.6
Turnips and swedes . . .	7.95	0.1	0.08
Clover, sainfoin, and grass . . .	40.5	4.4	1.15

STATISTICS

VALUE OF AGRICULTURAL PRODUCTION
(CENSUS OF PRODUCTION, 1908)

	<i>Eng. & Wales.</i> £1,000.	<i>Scotland.</i> £1,000.	<i>Ireland.</i> £1,000.
Farm crops	40,200	6,400	
Fruit, cider, perry, flowers, and timber	4,700	500	
Animals	50,800	10,600	45,574
Wool	2,100	500	
Dairy produce	25,500	4,500	
Poultry	4,350	650	
	<u>127,650</u>	<u>23,150</u>	<u>45,574</u>

The total for the United Kingdom, 196 mill., probably aggregates 210 mill. when allowance is made for produce consumed by farmers' households.

FORESTRY (CENSUS OF PRODUCTION, 1908)

AREA

	<i>Eng. & Wales.</i> 1,000 ac.	<i>Scotland.</i> 1,000 ac.	<i>Great Britain.</i> 1,000 ac.
Coniferous woods :			
Scots pine	49	156	205
Larch	69	25	94
Spruce	1	8	9
Others and mixed	135	293	428
Total	<u>254</u>	<u>482</u>	<u>736</u>
Broad-leaved woods :			
Oak	130	9	139
Beech	25	1	26
Birch	1	10	11
Others and mixed	476	75	551
Total	<u>632</u>	<u>95</u>	<u>727</u>
Mixed coniferous and broad-leaved woods	1,021	298	1,319
Total acreage of woodland	<u>1,907</u>	<u>875</u>	<u>2,782</u>

If to the total of Great Britain that of Ireland (301,000 acres) is added, the total area of woodland in the United Kingdom is found to aggregate 3,083,000 acres, the annual production being valued at £800,000.

FISHERIES

VALUE OF PRINCIPAL CATCHES
(AV. 1907-11)

	<i>Cod.</i> £1,000.	<i>Haddock.</i> £1,000.	<i>Herrings.</i> £1,000.	<i>Plaice.</i> £1,000.	<i>Total av. val.</i> <i>of all fish.</i> £1,000.
Eng. and Welsh coasts	1,161	1,321	1,311	954	8,095
Scottish coasts	370	520	1,523	81	3,013
Irish coasts	14		130	—	358
Total	<u>1,545</u>	<u>1,853</u>	<u>2,964</u>	<u>1,035</u> (approx.)	<u>11,466</u>

Highest year: *Cod*, 1911, £1,755,600; *Haddock*, 1907, £2,031,000; *Herrings*, 1910, £3,213,000; *Plaice*, 1911, £1,065,000 (approx.); *Total val. of all fish*, 1911, £11,826,000.

OUTPUT OF CHIEF MINERALS IN EACH COUNTRY IN ORDER OF VALUE (Av. 1907-11)

ENGLAND.	Output, 1,000 tons.	Value, £1,000.	H. Y.	£1,000.	Chalk.	Gravel and sand	Lead ore	Gypsum	Slate	Zinc ore	Av. val. of total output	Output, 1,000 tons.	Value, £1,000.	H. Y.	£1,000.
Coal	185,346.0	75,067.0	1907	79,227								4,598.0	186.5	1907	201
Iron ore	14,489.0	3,643.6	1907	4,021								17,411.0	133.4	1907	142
Clay and shale	11,944.0	1,456.6	1907	1,503								13.6	127.0	1907	198
Sandstone	2,987.0	991.0	1908	1,057								247.0	93.0	1911	104
Limestone, exclu. chalk	9,278.0	946.0	1907	991								54.4	92.4	1907	98
Igneous rock	3,322.0	662.6	1911	716								7.0	28.0	1911	52
Tin ore	7.7	682.6	1911	838								—	84,875.0	1907	89,711
Salt	1,901.0	571.0	1907	628								—	—	1907	89,711
WALES.															
Coal	40,040.0	22,528.0	1907	23,525	Lead ore							8.80	84.0	1907	129
Slate	320.6	926.0	1907	1,025	Clay							745.6	68.4	1908	77
Limestone	1,840.0	199.0	1910	216	Zinc							5.7	28.0	1907	48
Igneous rocks	1,072.0	180.0	1910	205								—	24,178.0	1907	25,341
Sandstone	808.6	122.6	1909	132	Av. val. of total output							—	—	1907	25,341
SCOTLAND.															
Coal	40,414.0	14,869.0	1907	17,728	Sandstone							777.0	207.6	1907	241
Oil shale	2,959.0	827.0	1910	861	Limestone							433.6	71.2	1908	80
Iron ore	707.4	317.0	1907	392	Lead ore							4.4	47.2	1907	63
Igneous rock	1,510.0	307.0	1908	324								—	16,959.6	1907	19,956
Clay and shale	1,425.0	255.0	1908	282	Av. val. of total output							—	—	1907	19,956
IRELAND.															
Coal	91.4	48.6	1908	50	Slate							49	14.2	1909	16
Limestone	560.8	52.0	1909	54	Iron ore							67.4	12.4	1907	16
Igneous rock	323.0	44.0	1911	48	Av. val. of total output							—	217.0	1911	222
Salt	47.8	16.4	1911	20								—	—	1911	222
ISLE OF MAN.															
Lead ore	2.0	19.8	1907	29	Igneous rock							11.4	1.8	1911	2
Zinc ore	2.2	12.8	1907	18	Slate							13.6	0.8	1911	1
Salt	7.6	5.2	1911	6	Av. val. of total output							—	41.8	1907	55

BRITISH ISLES

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OUTPUT OF ALL MINERALS, UNITED KINGDOM (Av. 1907-11)

	<i>Av. quantity, 1,000 tons.</i>	<i>Av. value, £1,000.</i>	<i>H. Y.</i>	<i>Value, £1,000.</i>	<i>Principal county of production.</i>
Alum shale . . .	9.0	1.0	1907	1.7	York, W. Riding.
Arsenical pyrites . .	1.4	1.9	1908	3.9	Cornwall.
Arsenic . . .	2.1	23.0	1907	35.8	Cornwall.
Barium (compounds)	42.0	39.0	1910	44.0	Northumberland.
Bauxite (alum clay)	7.8	1.8	1908	3.0	Co. Antrim.
Bog ore . . .	4.2	0.8	1907	1.5	Londonderry.
Chalk . . .	4,598.0	186.0	1907	200.9	Kent.
Chert and flint . .	63.0	13.0	1908	15.0	Derby.
Clay . . .	14,245.0	1,785.0	1907	1,850.0	Cornwall.
Coal . . .	165,891.0	112,512.0	1907	120,527.0	Glamorgan
Copper ore . . .	4.6	16.3	1907	21.0	Merioneth & Cornwall.
Copper precipitate	0.2	7.2	1907	12.7	Anglesey.
Fluor spar . . .	49.0	19.0	1907	23.0	Durham.
Gold (bar) . . .	(1,378 oz.)	4.7	1910	8.0	Merioneth.
Gravel and sand . .	2,247.0	168.0	1907	184.0	Kent & Nottingham.
Gypsum . . .	247.0	93.0	1911	104.0	Nottingham.
Igneous rock . . .	6,241.0	1,226.0	1910	1,263.0	Leicester.
Iron ore . . .	15,262.0	3,979.0	1907	4,433.0	Yorkshire.
Iron pyrites . . .	9.5	4.0	1907	4.5	Warwick.
Lead ore . . .	29.0	278.0	1907	419.0	Derby and Durham.
Limestone (excl. of chalk)	12,125.0	1,269.0	1907	1,324.0	Durham.
Manganese ore . . .	7.0	6.4	1907	16.5	Carnarvon.
Mica . . .	21.0	8.0	1910	9.3	Cornwall.
Ochre, umber, &c. . .	15.5	14.5	1910	14.4	Somerset.
Oil shale . . .	2,959.0	827.0	1910	860.0	Linlithgow.
Petroleum (none obtained since 1906).					
Salt . . .	—	1,957.0	1907	649.0	Cheshire and Stafford.
Sandstone . . .	4,613.0	1,331.0	1908	1,426.0	Lancashire.
Silver (obt. from lead and gold ore in the U.K.) . . (137,000 oz.)		14.6	1907	19.3	Flint, Westmorland.
Slate . . .	420.0	1,066.0	1907	1,179.0	Carnarvon.
Sulphate of strontia . .	10.3	7.7	1908	12.0	Glos. and Somerset.
Tin ore . . .	7.7	682.0	1911	838.0	Cornwall.
Wolfram ore . . .	0.3	29.0	1907	41.0	Cornwall.
		(approx.)			
Zinc ore . . .	14.8	69.7	1907	100.0	Cumberland.
Total value, U.K. . .	—	126,300.0	1907	135,280.0	

[Lignite: none raised, 1895-1910; 120 tons, value £60, obtained in Antrim, 1911.
Natural gas: av. output at Heathfield, Sussex, 1909-11, 240,000 c. ft. Phosphate of lime: production, 1907-11, 45 tons, value £66. Uranium ore: 58 tons per annum (76 in 1910), value not stated, obtained in Cornwall.]

METALS PRODUCED IN THE UNITED KINGDOM (Av. 1907-11)

	<i>Quantity, 1,000 tons.</i>	<i>Value, £1,000.</i>	<i>H. Y.</i>	<i>£1000.</i>
Pig-iron (from foreign ore)	4,701	15,794.0	1907	18,487.0
" (from British ore)	4,947	16,592.0	1907	19,004.0
White tin . . .	4.86	762.2	1911	931.9
Metallic lead . . .	21.5	320.8	1907	479.7
Zinc . . .	5.5	130.0	1907	186.6
Fine copper . . .	0.5	36.2	1907	62.7
Silver . . .	(137,000 oz.)	14.6	1907	19.3
Bar gold . . .	(1,378 oz.)	4.7	1910	8.0

VALUE OF METALLIC ORES IMPORTED INTO THE UNITED KINGDOM
(Av. 1907-11, in £1,000)

Iron ore (manganiferous), 160.3; iron ore (other sorts), 5,613; silver ore, 2,014.4; tin ore, 1,805; copper ore, 1,030; manganese ore, 892; gold, 760; zinc, 472; lead, 141; pyrites of iron or copper, 1,282.3; other ores, 640. Total imports, 14,810.

INDUSTRIES OF THE UNITED KINGDOM (CENSUS OF PRODUCTION, 1907)

(A detailed analysis of this census is furnished on p 215 seq.)

Ar. no. of persons employed (excl. outworkers).

(i) MANUFACTURES, TRACTION, ETC.	Gross Output.			Total.	Per cent of total output.	Ar. no. of persons employed (excl. outworkers).		
	England and Wales.	Scotland.	Ireland.			England and Wales.	Scotland.	Ireland.
	£1,000.	£1,000.	£1,000.			1,000.	1,000.	1,000.
Iron and steel, engineering and shipbuilding trade	307,809	61,373	5,814	375,196	19.0	1,271.0	230.7	37.8
Textiles (excl. other cotton manufactured)	279,505	29,154	15,830	324,555	16.4	984.8	841.0	92.4
Food and drink trade	205,177	31,054	27,335	263,576	13.5	319.5	71.0	35.6
Mines and quarries	125,151	22,617	2,58	148,026	7.5	829.0	132.0	3.8
Clay, stone, building, and contracting trade	101,443	12,811	2,478	116,692	5.9	636.0	80.5	18.5
Clothing trades	94,056	8,737	5,109	107,983	5.45	638.0	75.9	42.4
Metal trades (excluding iron and steel)	91,493	1,790	182	93,465	4.7	108.0	5.5	0.8
Public utility services	67,538	6,669	2,604	77,051	3.9	280.7	29.4	32.4
Chemical and allied trades	63,303	6,591	1,191	71,032	3.8	103.2	9.3	2.6
Paper, printing, and stationery	50,845	8,771	1,792	61,308	3.1	268.5	44.4	12.6
Timber trade	31,418	7,599	1,279	40,287	2.03	180.8	34.5	7.7
Leather and canvas trades	22,849	2,045	226	26,020	1.32	135.5	6.2	1.0
Tobacco trade	—	—	—	23,870	1.2	—	37.6	—
Other cotton manufact.	—	—	—	6,066	0.45	—	34.7	—
Rubber-rubber trade	—	—	—	8,908	0.45	—	24.0	—
House furnishings not of wood	—	—	—	6,103	0.3	—	16.2	—
Explosives and ammunition	—	—	—	3,947	0.2	—	12.7	—
Miscellaneous trades	7,615	599	74	8,288	0.4	42.6	3.9	0.3
	1,490,749	207,840	16,777	1,795,366	89.46	5,808.2	885.4	291.3
						U. K.	6,984.9	

The total cost of materials is set down at £1,038,340,000, and the net output (gross selling value less cost of materials and work given out, £24,895,000) at £712,135,000. To this total it is estimated that a further £50,000,000 should be added in respect of about one million persons whose output was not returned to the Census Office.

(ii) AGRICULTURE AND FISHERIES

	Value of Production.	Persons employed.
Agriculture	127,650	1,128 ^b
Fisheries	8,156	36 ^c
		212.0 ^b
		28.9 ^d
		984 ^e

£10,000,000 when allowance is made for dairy produce, poultry, and eggs, and cider consumed by farmers' households in Great Britain, and output of holdings not exceeding 1 acre.

^a Regularly employed; persons employed occasionally number 34,000.

^b Including farmers.

RAILWAYS

Paid-up capital: England and Wales, 1,093 mill.; Scotland, 185.7 mill.; Ireland, 45 mill.; total, 1,324 mill. Average dividend, 1907-11: England and Wales, 3.53%; Scotland, 2.95%; Ireland, 3.82%; United Kingdom, 3.46 %.

	Total length, 1911. Miles.	Av. passenger traffic receipts, 1907-11 £1,000.	Av. goods traffic receipts, 1907-11. £1,000.	Av. gross receipts (inclu. miscell.), 1907-11. £1,000.	Av. working expenditure, 1907-11. £1,000.	Proportion of working expendi- ture to gross re- ceipts, 1907-11.
England and Wales	16,200	44,665.5	51,871	105,173	66,567	63.28
Scotland	3,815	5,209.0	6,990	12,993	7,379	56.79
Ireland	3,402	2,237.0	2,005	4,382	2,703	61.7
United Kingdom	23,417	52,111.5	60,866	122,548	76,649	62.55
Highest year, 1911	—	53,995.0	63,285	127,199	78,618	62.0

TRAMWAYS AND LIGHT RAILWAYS

	Paid-up capital, Dec. 31, 1911. £1,000.	Length of line, 1911. Miles.	Av. gross receipts, 1907-11. £1,000.	Av. working exp., 1907-11 £1,000.	Proportion of working expendi- ture to gross re- ceipts, 1907-11.
England and Wales	63,184	2,134	10,540	6,719	63.74
Scotland	7,538	300	1,662	923	55.54
Ireland	4,003	163	555	325	58.56
United Kingdom	74,725	2,597	12,757	7,967	62.46
Highest year, 1911	—	—	13,777	8,501	61.7

SHIPPING

TOTAL NET TONNAGE OF BRITISH AND FOREIGN VESSELS ENTERED AND CLEARED AT PORTS IN THE UNITED KINGDOM WITH CARGOES AND IN BALLAST

Av. of five years.	1,000 tons.	H. Y.	1,000 tons.	Av. ton. of Brit. Vessels.	% of total.
1897-1901	94,842	1900	98,524	63,855	67.3
1902-6	108,909	1906	120,790	69,919	64.10
1907-11	134,185	1911	138,900	80,128	59.73

NATIONALITY OF VESSELS ENTERED AND CLEARED
(Av. 1907-11)

	1,000 tons.	% of total.	H. Y. 1911.
			1,000 tons.
British	80,128	59.73	81,885
Gorman	13,670	10.2	14,017
Norwegian	8,891	6.63	9,593
Danish	5,681	4.23	5,577
Swedish	5,107	3.85	5,330
Dutch	4,890	3.64	5,714
French	3,287	2.45	3,347
Spanish	2,820	2.11	2,807
Belgian	2,053	1.98	3,492
Other countries	7,049	5.18	7,085
Total	134,185	100.0	138,900

PRINCIPAL PORTS, NET TONNAGE ENTERED AND CLEARED FROM FOREIGN COUNTRIES AND BRITISH POSSESSIONS
(Av. 1907-11)

	1,000 tons.	% of total.	H. Y. 1911.
			1,000 tons.
ENGLAND :			
London	20,356	15.17	20,978
Liverpool	14,742	10.98	14,768
Cardiff	14,504	10.81	13,854
Newcastle-on-Tyne, N. and S. Shields	12,106	9.23	12,796
Southampton	8,202	6.11	8,817
Hull	6,896	4.91	6,720
Newport	3,762	2.8	3,996
Dover	3,470	2.58	5,129
Blyth	3,156	2.35	3,362
Middlesbrough	3,154	2.35	3,254
Plymouth	3,024	2.25	3,167
Manchester (exclu. Runcorn)	2,980		2,425
Sunderland	2,962	2.20	3,164
Swansea	2,842	2.19	3,095
Grimsby	1,710	1.27	2,950
Bristol	1,612	1.20	1,867
SCOTLAND :			
Glasgow	5,220	3.89	5,565
Leith	2,694	2.0	2,866
IRELAND :			
Belfast	656	0.49	618

Vessels Registered. Av. 1907-11. (1) Sailing, no. 9,300 (1901, 10,572; 1911, 8,830); net tonnage, 1,251,832 (1911, 980,997). (2) Steam, no. 11,812 (1901, 9,484; 1911, 12,242); net tonnage, 10,321,477 (1911, 10,717,500).
Vessels Built (Mercantile). Av. 1907-11. (1) Sailing, no. 425 (1901, 638; 1911, 374); net tonnage, 35,498 (1911, 38,000). (2) Steam, no. 881 (1901, 750; 1911, 1,024); net tonnage, 775,929 (1911, 1,069,750).
Ship of war: 48.
Royal Navy, av. 1907-11, tons displacement, 131,037 (1911, 228,000).
For foreign countries, av. 1907-11, tons (gross), 9,300 (1911, 8,139).

IMPORTS AND EXPORTS (EXCLUSIVE OF BULLION AND SPERM)

IMPORTS (exclu. of values of diamonds imp. from the Union of S. Africa)

<i>Av. of five years.</i>	<i>Total Imports.</i>			<i>Proport. per head of pop. of U.K. (Av.)</i>	<i>Av. net imp.*</i>			<i>Proport. per head of pop. of U.K. (Av.)</i>
<i>Mill. £.</i>	<i>H. Y.</i>	<i>Mill. £.</i>		<i>£ s. d.</i>	<i>Mill. £.</i>	<i>H. Y.</i>	<i>Mill. £.</i>	<i>£ s. d.</i>
1897-1901	490.4	1900	523.0	12 0 5	427.0	1900	459.9	10 9 4
1902-6	558.8	1906	607.9	13 2 3	485.3	1906	522.8	11 7 8
1907-11	644.4	1911	680.0	14 9 5	550.5	1911	577.4	12 7 3

* Total imports less re-exports.

EXPORTS

<i>Av. of five years.</i>	<i>Av. of total exp.</i>			<i>Av. exp. of U.K. prod.</i>	<i>Per head of pop.</i>	<i>Av. exp. of For. and Col. prod.</i>
<i>Mill. £.</i>	<i>H. Y.</i>	<i>Mill. £.</i>		<i>Mill. £.</i>	<i>£ s. d.</i>	<i>Mill. £.</i>
1897-1901	324.0	1900	354.4	260.6	6 7 9	63.4
1902-6	389.8	1906	460.7	316.0	7 8 2	78.8
1907-11	507.0	1911	556.9	413.1	9 5 7	93.9

TRADE WITH PRINCIPAL COUNTRIES

Average net value of Merchandise consigned to and retained in the United Kingdom from Foreign Countries and British Possessions (total imports less re-exports) and of the produce and manufactures of the United Kingdom consigned to Foreign Countries and British Possessions.

(Av. 1907-11)					
IMPORTS			EXPORTS		
<i>British Possessions.</i>	<i>Mill. £.</i>	<i>% of total.</i>	<i>British Possessions.</i>	<i>Mill. £.</i>	<i>% of total.</i>
British India	28.6	5.19	British India	48.6	11.76
Canada	24.0	4.36	Australia	26.0	6.29
Australia	21.6	3.92	Canada	17.0	4.11
New Zealand	14.4	2.61	Union of S. Africa	15.8	3.82
Other British poss.	19.9	3.64	New Zealand	8.6	2.08
			Other British poss.	23.7	5.76
Total, Brit. poss.	108.5	19.72	Total, Brit. poss.	139.7	33.82
Foreign Countries.			Foreign Countries.		
United States	113.0	20.52	Germany	36.6	8.86
Germany	56.0	10.17	United States	28.2	6.82
France	38.0	6.9	France	22.6	5.47
Russia	36.0	6.54	Argentina	18.2	4.40
Argentina	29.0	5.27	Italy	13.4	3.24
Denmark	19.0	3.45	Netherlands	12.6	3.05
Belgium	17.6	3.12	Russia	12.2	2.95
Netherlands	16.6	3.01	Brazil	11.2	2.71
Egypt	16.0	2.9	Belgium	10.6	2.56
Spain	13.6	2.47	Japan	10.4	2.52
Sweden	10.4	1.89	China*	10.0	2.42
Other for. countries	76.8	14.04	Egypt	9.4	2.27
			Other for. countries	78.0	18.91
Total, for. countries	442.0	80.28	Total, for. countries	273.4	69.18
Total imp. retained	550.5	100.0	Total exp. of home produce, &c.	413.1	100.0

Excluding Hong-Kong, Macao, and Wei-hai-wei.

PRINCIPAL ARTICLES IMPORTED
EXCLUSIVE OF BULLION AND SPECIE. AV. 1907-11

	<i>Mill. £.</i>	<i>In every mill. £ of imports.</i>	<i>H. Y.</i>	<i>Mill. £.</i>
I. FOOD, DRINK, AND TOBACCO :				
Wheat	40.6	62,980	1909	45.3
Maize	11.6	18,000	1907	14.6
Other farinaceous substances	24.6	38,220	—	—
Total grain and flour	76.8	119,200	1909	83.1
Bacon	14.0	21,720	1907	14.8
Beef	12.2	18,930	1910	13.4
Mutton	9.0	13,900	1910	10.1
Other sorts of meat	14.4	22,350	—	—
Total meat (inclu. animals for food)	49.6	76,960	1907	51.9
Butter	23.4	36,310	1911	24.6
Eggs	7.3	11,310	1911	—
Cheese	6.8	10,550	1911	—
Other articles	32.4	50,330	—	—
• Total non-dutiable articles	69.9	108,500	1911	73.6
Sugar, refined	12.8	19,860	1911	14.3
" unrefined :				
Beetroot	4.9	7,600	1911	5.8
Cane	4.0	7,140	1910	7.8
Tea	11.6	18,000	1911	12.48
Wine	3.9	6,050	1910	4.2
Other articles	14.0	22,050	—	—
Total dutiable articles	52.4	81,300	1911	59.5
Tobacco	4.8	7,440	1911	5.3
Total, Class I.		393,400		
II. RAW MATERIALS AND ARTICLES MAINLY UNMANUFACTURED :				
Cotton, raw	65.9	102,300	1910	71.7
Wool	35.1	54,400	1910	37.3
Oil, seed, gums, nuts, &c.	32.5	50,430	1910	37.5
Wood and timber	25.4	36,410	1907	27.0
Other textiles	14.3	22,190	1907	18.0
Hides, undressed skins	11.1	17,220	1910	12.9
Iron ore, scrap iron, and steel	5.9	9,150	1907	7.3
Other metallic ores	9.0	13,900	1907	10.1
Materials for paper	4.6	7,140	1910	4.9
Miscellaneous :				
Caoutchouc	15.5	24,050	1910	26.1
Other articles	15.5	24,050	—	—
Total	31.0	48,100	1910	42.4
Total, Class II.	234.8	364,360	1910	261.2

III. ARTICLES WHOLLY OR MAINLY MANUFACTURED:

	Mill. £.	In every mill. £ of imports.	H. Y.	Mill. £.
Metals, not elsewhere specified, and manufactures	26.0	40,340	1907	28.9
Silk yarn and manufactures	13.2	20,480	1907	13.6
Leather goods (exclud. boots and shoes)	11.6	18,000	1911	12.2
Chemicals, drugs, dyes	11.0	17,070	1907	11.6
Cotton yarn and manufactures	10.3	15,980	1911	11.3
Woollen yarn and manufactures	9.8	15,210	1907	10.8
Iron and steel	8.6	13,350	1911	11.1
Other yarns and textiles	7.3	11,320	1910	8.0
Machinery and electrical goods	6.2	9,620	1911	7.2
Paper	6.0	9,310	1911	6.6
Vehicles	5.2	8,070	1911	6.5
Apparel	4.8	7,440	1911	5.2
Cutlery, hardware	4.3	6,670	1911	5.3
Earthenware and glass	3.9	6,050	1907	4.0
Manufactures of wood and timber (in- cluding furniture)	2.1	3,260	1911	2.5
Miscellaneous	23.3	36,160	1910	23.8
Total, Class III.	153.6	238,330	1911	165.5
Miscellaneous and unclassified (includ- ing Parcel Post)	2.5	3,910	1909	2.57
Total Imports	644.4	1,000,000	1911	580.5

CHIEF ARTICLES IMPORTED AND RETAINED FOR HOME CONSUMPTION
FROM THE PRINCIPAL FOREIGN COUNTRIES AND BRITISH POSSES-
SIONS, 1907-11

FOREIGN COUNTRIES

	£1,000. H. Y.	£1,000.		£1,000. H. Y.	£1,000.
<i>Argentina:</i>			<i>Rumania:</i>		
Wheat	8,455	1908 13,097	Maize	2,028	1911 3,458
Beef	6,872	1911 9,116	<i>Russia:</i>		
Maize	4,635	1909 6,707	Wheat	6,764	1910 12,015
Mutton	2,419	1911 2,891	Wood, sawn or split	6,413	1910 7,329
<i>Austria-Hungary:</i>			Butter	3,130	1908 3,434
Sugar	3,675	1909 4,249	Eggs	2,993	1911 3,774
<i>Belgium:</i>			<i>Spain:</i>		
Zinc, &c.	1,328	1911 1,479	Iron ore	4,037	1907 5,338
Woollen yarn	1,238	1910 1,368	Oranges	1,862	1909 2,001
Flax	1,086	1909 1,206	<i>Sweden:</i>		
<i>Brazil:</i>			Wood, sawn or split	3,026	1907 3,593
Caoutchouc	2,825	1910 6,076	Butter	1,812	1911 2,183
<i>Denmark:</i>			<i>Switzerland:</i>		
Butter	10,248	1908 10,589	Silk, broad stuffs	1,702	1907 1,852
Bacon	5,937	1911 6,630	Embroidery	1,498	1911 1,797
<i>Egypt:</i>			<i>United States:</i>		
Cotton, raw	12,639	1907 14,307	Cotton, raw	40,321	1910 44,380
" seeds	2,449	1907 2,893	Wheat	7,068	1908 10,779
<i>France:</i>			Bacon	5,628	1908 6,554
Silk, broad stuffs	3,446	1909 3,765	Wheatmeal and flour	3,953	1908 5,407
Woollen stuffs	3,297	1907 3,804	Lard	3,874	1909 4,063
Motor-cars, cycles, and parts	2,426	1907 2,857	Leather	3,448	1908 3,696
Wine	1,850	1911 2,003	Tobacco, unmanu- factured	2,891	1908 3,212
<i>Germany:</i>			Maize	2. 6	1907 3,924
Sugar, refined	5,399	1908 5,282			
" unrefined	3,602	1911 4,287			
Iron and steel	3,767	1911 5,078			
<i>Netherlands:</i>					
Margarine	2,235	1910 2,770			
Sugar	2,082	1911 2,865			

BRITISH ISLES

575

BRITISH POSSESSIONS

	£1,000. H. Y.	£1,000.		£1,000. H. Y.	£1,000.
<i>Australia:</i>			<i>Cape of Good Hope:</i>		
Wool	5,758	1911 6,885	Sheep and lambs' wool	958	1909 1,110
Wheat	4,329	1910 5,677	<i>Ceylon:</i>		
Butter	3,003	1910 3,483	Tea	2,887	1911 3,142
Mutton	1,830	1910 2,524	<i>New Zealand:</i>		
<i>British India</i>			Wool	5,839	1910 6,798
Wheat	6,143	1911 7,887	Mutton	3,817	1910 4,232
Tea	5,430	1911 6,180	<i>Straits Settlements:</i>		
Jute	3,712	1907 4,833	Tin	1,624	1907 2,118
<i>Canada:</i>			Cautehouse	607	1911 1,234
Wheat	6,382	1909 7,557			
Cheese	4,546	1907 4,919			
Wood, sawn or split	3,073	1907 3,303			

BULLION AND SPECIE (Av. 1907-11)

IMPORTS (consignments)

Countries from whence consigned.	Total of gold and silver bul. and specie. £1,000.	% of total imports.	H. Y. 1907. £1,000.	Av. imp. of silver bul and sp. £1,000.
United States	12,785	19.35	12,614	10,693.0
• France	3,409	5.25	5,375	280.0
Egypt	2,285	3.45	2,086	22.0
Germany	2,124	3.21	7,719	253.0
Other foreign countries	3,374	5.11	4,593	615.0
Total foreign countries	24,037	36.37	32,387	11,803.0
British possessions:				
Transvaal	30,453	46.07	7,471	
Australia	2,700	4.18	4,397	
British India	2,271	3.44	2,280	35.0
Rhodesia	2,220	3.30	1,007	
Gold Coast	1,020	1.50	1,198	41.0
New Zealand	810	1.24	600	48.0
Other British poss.	2,503	3.78	2,070	1,260.1*
Total British possessions	42,055	63.63	10,085	1,441.0
Total imports	66,092	100.0	72,072	13,304.0

* Canada, av 1907-11, £530,000 (1911, £1,103,800)

EXPORTS (consignments)

Countries to which consigned.				
France	11,248	17.98	8,729	830.0
Germany	6,809	10.88	3,164	1,048.0
Egypt	5,218	8.34	4,900	103.0
United States	4,416	7.06	18,355	43.0
Brazil	2,800	4.47	3,904	148.0
Uruguay	2,557	4.09	2,199	—
Russia	2,333	3.73	1,109	868.0
Turkey	2,174	3.47	1,529	25.0
Argentina	1,662	2.66	1,370	2.0
China	1,059	1.69	376	1,059.0
Other foreign countries	4,478	7.17	2,701	381.0
Total foreign countries	44,754	71.54	47,236	4,567.0
British possessions:				
British India	15,479	24.74	17,266	8,548.0
Other British poss.	2,331	3.72	3,285	1,633.0†
Total British possessions	17,810	28.46	20,551	10,181.0
Total exports	62,564	100.0	67,787	14,748.0

† Nigeria, £310,000; Gold Coast, £284,000; Australia, £255,000.

**PRINCIPAL ARTICLES, THE PRODUCE AND MANUFACTURE OF
THE UNITED KINGDOM, EXPORTED (Av. 1907-11)**

	<i>Mill. £.</i>	<i>In every mill. £. of exp.</i>	<i>H. Y.</i>	<i>Mill. £.</i>
I. FOOD, DRINK, AND TOBACCO :				
Herrings	4.1	9,920	1911	4.9
Grain and flour	3.4	8,230	1911	3.57
Spirits	3.3	7,990	1911	3.78
Beer	1.8	4,360	1911	1.95
Tobacco	1.7	4,110	1911	2.17
Meat	0.9	2,180	1911	1.02
Other food and drink	9.3	22,510	1911	11.64
Total, Class I.	24.5	59,300	1911	29.03
II. RAW MATERIALS AND ARTICLES MAINLY UNMANUFACTURED :				
Coal and coke	39.4	95,370	1907	42.1
Oil seeds, oil, &c.	3.95	9,550	1910	5.0
Wool	3.92	9,490	1909	4.6
Hides and skins	1.7	4,110	1909	1.9
Miscellaneous	4.34	10,510	—	—
Total, Class II.	53.31	129,030	1907	55.58
III. ARTICLES WHOLLY OR MAINLY MANUFACTURED :				
Cotton goods :				
Piece goods	77.75	188,200	1911	90.5
Yarn	13.82	33,450	1911	15.6
Other manufactures	13.4	32,480	1911	13.9
Total cotton exports	104.97	254,080	1911	120.0
Iron and steel :				
Galvanized sheets	6.77	16,390	1911	7.6
Tinned plates	6.11	14,790	1911	6.8
Pig and puddled iron	4.6	11,140	1907	7.2
Miscellaneous	24.29	58,780	—	—
Total iron and steel	41.77	101,100	1907	46.6
Woollen yarns and manufactures	33.45	80,950	1910	37.5
Machinery :				
Textile machinery	7.9	19,120	1908	8.8
Other machinery	22.3	53,980	1907	23.7
Total	30.2	73,100	1907	31.7
Chemicals	17.7	42,940	1911	20.0
Textiles, not previously specified	12.8	30,980	1907	14.0
Apparel	10.95	26,510	1911	13.8
Metals and mfrs. thereof, not specified elsewhere :				
Tin, unwrought	1.66	4,020	1911	2.17
Other metals	8.46	20,470	1907	10.12
Total	10.12	24,490	1907	11.67
Ships, new	8.19	19,830	1908	10.56
Vehicles	7.17	17,360	1911	8.12
Cutlery and hardware	6.23	15,080	1911	7.4
Leather (other than boots and shoes)	4.44	10,750	1911	4.88
Earthenware and glass	4.1	9,920	1911	4.7
Paper	2.73	6,610	1911	3.3
Electrical apparatus	2.71	6,320	1910	4.1
Silk	2.12	5,130	1907	2.4
Wood and manufactures thereof	1.59	3,850	1911	2.0
Miscellaneous	26.67	64,810	1911	30.8
Total, Class III.	327.976	793,810	1911	362.22
Miscellaneous and unclassified (including Parcel Post)				
	7.378	17,860	1911	9.13
Total exports of U.K. produce	413.157	1,000,000	1911	454.12

CHIEF ARTICLES, UNITED KINGDOM MANUFACTURE AND PRODUCE,
EXPORTED TO THE PRINCIPAL FOREIGN COUNTRIES AND BRITISH
POSSESSIONS (Av. 1907-11)

FOREIGN COUNTRIES.

	£1,000.	H. Y.	£1,000.		£1,000.	H. Y.	£1,000.
<i>Argentina:</i>				<i>Italy:</i>			
Iron and steel, and				Coal	5,602	1908	5,849
manufa. thereof	3,653	1909	4,450	Machinery	1,447	1908	1,993
Cotton piece goods	2,601	1911	2,911	<i>Japan:</i>			
Coal	2,030	1911	2,456	Iron and steel, and			
<i>Belgium:</i>				manufa. thereof	1,956	1907	2,317
Machinery	975	1907	1,015	Machinery	1,719	1908	2,137
Cotton piece goods	841	1907	947	Cotton piece goods	1,566	1907	1,938
Iron and steel, and				<i>Java:</i>			
manufa. thereof	812	1907	1,036	Cotton piece goods	2,211	1911	2,865
<i>Brazil:</i>				<i>Netherlands:</i>			
Cotton piece goods	1,839	1911	2,465	Cotton yarn	1,852	1907	2,162
Coal	1,251	1911	1,442	Coal	1,350	1907	2,124
<i>Chile:</i>				Iron and steel, and			
Cotton piece goods	1,061	1907	1,400	manufa. thereof	1,331	1907	1,758
<i>China (includ. Hong</i>				<i>Norway:</i>			
<i>Kong, etc.):</i>				Coal	1,046	1908	1,165
Cotton piece goods	8,151	1911	9,869	<i>Russia:</i>			
<i>Denmark:</i>				Machinery	2,644	1911	3,080
Coal	1,644	1908	1,785	Coal and coke	1,046	1908	2,204
piece goods	3,358	1911	4,109	Herrings	1,100	1911	1,380
Coal	1,880	1907	2,104	<i>Spain:</i>			
<i>France:</i>				Coal	1,418	1908	1,450
Coal	5,911	1907	6,445	<i>Sweden:</i>			
Machinery	2,024	1911	2,273	Coal	2,266	1908	2,674
Woolen goods	1,501	1911	1,632	<i>Switzerland:</i>			
<i>Germany:</i>				Cotton piece goods	1,140	1911	1,594
Coal	4,788	1907	5,160	<i>Turkey (includ. Crete):</i>			
Cotton yarn	4,157	1911	5,172	Cotton piece goods	4,611	1911	5,416
Woolen yarn	3,403	1907	3,803	<i>United States:</i>			
Herrings	2,109	1911	2,512	Linen piece goods	2,895	1909	3,336
Machinery	2,002	1907	2,365	Iron and steel, and			
Iron and steel, and				manufa. thereof	2,729	1907	4,150
manufa. thereof	1,877	1907	2,834	Cotton piece goods	2,002	1907	2,771
				Woolen piece goods	1,317	1910	1,633

BRITISH POSSESSIONS

	£1,000.	H. Y.	£1,000.		£1,000.	H. Y.	£1,000.
<i>Australia:</i>				<i>Cape of Good Hope:</i>			
Iron and steel, and				Apparel	1,054	1911	1,315
manufa. thereof	4,364	1911	5,421	<i>Hong Kong:</i>			
Cotton piece goods	3,078	1911	3,527	Cotton piece goods	1,453	1909	1,835
Machinery	1,717	1911	2,110	<i>New Zealand:</i>			
Woolen piece goods	1,606	1911	1,862	Iron and steel, and			
<i>British India:</i>				manufa. thereof	1,374	1911	1,570
Cotton piece goods	23,383	1911	26,878	<i>Nigeria, S.:</i>			
Iron and steel, and				Cotton piece goods	877	1911	1,036
manufa. thereof	5,503	1907	5,843	<i>Straits Settlements:</i>			
Machinery	4,209	1907	5,364	Cotton piece goods	1,280	1910	1,394
Cotton yarn	2,017	1908	2,395	<i>Trinidad:</i>			
<i>Canada:</i>				Apparel	753	1911	1,077
Woolen piece goods	2,243	1910	2,632				
Iron and steel, and							
manufa. thereof	2,693	1910	2,494				
Cotton piece goods	1,421	1910	1,683				

EMIGRATION AND IMMIGRATION

(Av. 1907-11)

EMIGRATION

<i>Countries in which passengers of Brit. nationality contracted to land.</i>	1,000.	% of total.	H. Y. 1911 1,000.
British North America	132.0	36.67	184.86
Australia and New Zealand	44.5	12.36	80.77
Cape of Good Hope and Natal	24.1	6.69	30.77
Other British possessions	18.1	5.03	19.35
Total	218.7	60.75	315.75
Foreign countries :			
United States	126.1	35.02	121.81
Other foreign countries	15.2	4.23	16.97
Total foreign countries	141.3	39.25	138.78
Grand total	360.0		454.53

IMMIGRATION

<i>Countries in which British passengers embarked.</i>	1,000.	% of total.	H. Y. 1911 1,000.
British North America	39.7	25.66	50.1
Cape and Natal	22.4	13.35	23.2
Australia and New Zealand	12.9	7.68	15.0
Other British possessions	15.5	9.24	17.0
Total	90.5	53.93	105.3
Foreign countries :			
United States	64.0	38.15	72.1
Other foreign countries	13.3	7.92	15.2
Total foreign countries	77.3	46.07	87.3
Grand total	167.8	100.0	192.6

The average no. of persons who left the United Kingdom for places out of Europe, 1907-11, was 547,600, the foreign passengers averaging 187,600; passengers arriving in the United Kingdom averaged 309,400 (foreigners 141,600).

VITAL STATISTICS

Av. 1907-11, PER 1,000 OF POPULATION

	BIRTHS		DEATHS		PERSONS MARRIED	
	Average.	1911.	Average.	1911.	Average.	1911.
England and Wales	25.7	24.4	14.52	14.6	15.18	15.2
Scotland	26.98	25.6	15.9	15.1	13.4	13.4
Ireland	23.3	23.3	17.16	16.5	10.36	10.7
United Kingdom	25.6	24.4	14.72	14.8	14.54	14.6

REVENUE AND EXPENDITURE

REVENUE (Receipts into the Exchequer)				EXPENDITURE (Issues out of Exchequer chargeable to Revenue)		
Av. of	Mill. £.	H. Y.	Mill. £.	Av. Mill. £.	H. Y.	Mill. £.
1897-8—1901-2	131.4	1901-2	152.7	154.4	1901-2	205.2
1902-3—1906-7	154.8	1902-3	161.3	160.6	1902-3	194.2
1907-8—1911-12	166.0	1910-11	203.8 ¹	162.6	1911-12	178.5

Included arrears of 1909-10.

PRINCIPAL ITEMS OF REVENUE AND EXPENDITURE

Av. 1907-8—1911-12

REVENUE			EXPENDITURE		
	Mill. £.	% of total.		Mill. £.	% of total.
Prop. and income tax	37.2	22.41	Civil Service	38.2	23.5
Excise	35.8	21.57	Navy	36.4	22.39
Customs	31.6	19.04	Army	27.2	16.73
Post Office and telegrs.	23.4	14.09	Nat. Debt Service	25.6	15.74
Estate, &c., Duties	22.0	13.25	Post Office	19.2	11.81
Stamps (ex. Fee and Patent)	8.6	5.18	Paid to local taxation	9.9	6.1

National Debt.—The gross capital liabilities of the State on March 31 averaged, 1898-1902, 676.4 millions (March 31, 1902, 765 millions); 1903-7, 791.4 millions (March 31, 1903, 798 millions); 1908-12, 747 millions (March 31, 1910, 762.5 millions).

LOCAL AUTHORITIES

RECEIPTS. IN MILLIONS STERLING

Average of	Eng. & Wls.	Scotland.	Ireland.	U.K.	Highest Year.
1895-6—1899-1900	86.4	13.0	5.2	104.6	1899-1900 121.4
1900-1—1904-5	128.2	17.0	6.4	151.6	1904-5 168.4
1905-6—1909-10	145.2	18.6	8.0	171.8	1909-10 *195.8

* Included Port of London Authority Loan, 22.57 mill., and other receipts, 2.68 mill.

EXPENDITURE

1895-6—1899-1900	86.8	13.0	5.2	105.0	1899-1900 121.4
1900-1—1904-5	125.6	17.4	6.2	149.2	1904-5 163.6
1905-6—1909-10	143.4	18.6	8.0	170.0	1909-10 †193.6

† Included expenditure in respect to the Port of London purchase scheme.

CHIEF SOURCES OF REVENUE

Av. 1905-6—1909-10

REVENUE			EXPENDITURE		
	Mill. £.	% of total.		Mill. £.	% of total.
Rates	69.8	40.63	By town and municipal authorities for police, sanitary, and public works	105.6	62.13
Loans	29.6	17.2	By county authorities for police, asylums, turnpikes, &c.	21.4	12.59
Government contrib.	24.8	14.4	*Relief of poor	17.6	10.35
Gas undertakings	9.6	5.59	Harbour authorities	12.6	7.4
Tramways	8.6	5.0			
Tolls	6.6	3.8			
Water undertakings	5.8	3.37			

SAVINGS BANKS. (1) *Post Office.* Av. 1907-11. Amount received in the United Kingdom, 48 mill. (1911, 50.14 mill.). Interest credited, 3.88 mill. (1911, 4.09 mill.). Amount paid, 45.9 mill. (1911, 46.6 mill.). Due to depositors at end of year, 165.63 mill. (1911, 176.5 mill.). Average number of accounts open at end of year, 11.3 mill. (1911, 12.37 mill.). Av. amount due to each depositor, 1911, active accounts £20 16s. 8d., dormant 2s. 1d. (2) *Trustee Savings Banks.* Av. 1907-11. Amount received in the United Kingdom, £13.6 mill. (1911, 14.28 mill.). Interest credited, 1.3 mill. (1911, 1.317 mill.). Amount paid, 14.93 mill. (1911, 14.8 mill.). Due to depositors, 52.27 mill. (1911, 53 mill.). Accounts open, 1.81 mill. (1911, 1.849 mill.). Av. amount due to each depositor, £28 17s. 7d. (1911, £28 13s. 7d.).

BANKERS' CLEARING HOUSES. Av. amount cleared per annum, 1907-11, in millions sterling: London, 13,529 (1911, 14,614); Manchester, 307.6 (1911, 336.2); Liverpool, 202.7 (1911, 217.9); Birmingham, 59.9 (1911, 63.7); Newcastle, 49.6 (1911, 48.3); Bristol, 31.6 (1911, 33.5); Sheffield, 21.2 (1911, 22.5); Leeds, 21.4 (1911, 22.4); Nottingham, 15.9 (1911, 15.9); Leicester, 12.4 (1911, 13.1).

GIBRALTAR

Area.—1,200 acres (1½ sq.m.).

Live Stock.—The av. number of horses, 1907-11, was 296 (1911, 295), of horned cattle, 277 (1911, 348). No returns for sheep and pigs.

SHIPPING

TOTAL TONNAGE ENTERED AND CLEARED

Av. of years.	1,000 tons.	Highest Year.	1,000 tons.
1897-1901	8,730	1898	9,114
1902-6	8,570	1906	9,373
1907-11	10,331 *	1911	11,704

* 62.14 % were British vessels (United Kingdom, 60.12 %), and 37.86 % foreign vessels (Germany, 18.19 %; Italy, 3.77 %; Spain, 3.1 %).

CIVIL POPULATION

	Males.	Females.	Total.	Inc. or dec. % in intercensal period.	No. of males per 1,000 females.
1881	8,640	9,741	18,381	-1.7	887
1891	8,680	10,420	19,100	+3.9	833
1901	9,403	10,952	20,355	+6.5	858
1911	8,786	10,334	19,120	-6.0	850

Civil population per square mile, 1911, 10,197.

Military (5,340) and Royal Navy (441) brought up the total population on April 2, 1911, to 24,901, as compared with 27,460 in 1901. The military population, 5,340, comprised 4,103 officers, non-commissioned officers, and soldiers, 475 wives of officers and soldiers, and 762 children.

Religious Census of Civil Population (in thousands).—Roman Catholics, 15.7 (80.4 % of total); Church of England, 2.3 (11.8 %); Wesleyans, 0.1 (0.6 %); Presbyterians, 0.07 (0.4 %); Hebrew, 1.1 (5.7 %).

REVENUE

EXPENDITURE

Av. of years.	£1,000.	H.Y.	£1,000.	£1,000.	H.Y.	£1,000.
1897-1901	59.6	1901	71.0	56.0	1901	63.0
1902-6	84.4	1906	92.0	64.4	1906	69.5
1907-11	85.5 *	1911	94.6	76.7	1909	82.3

Customs, £35,000; Post and Telegrams, £13,300; Rents, £14,600.

MALTA

Area.—117.36 sq.m. (Málta, 91.56 sq.m.; Gozo, 24.8 sq.m.; Comino, 1 sq.m.), i.e. approximately five-sixths the area of the Isle of Wight.

Agriculture.—Est. total acreage, 75,111; est. agricultural acreage, 46,573; cultivated land, 41,866; uncultivated land, 4,707.

Crops.—Area and produce. Av. 1908–12. MALTA: wheat, 7,009 acres (16,080 qrs.); barley, 2,569 ac. (7,000 qrs.); beans and peas, 1,455 ac. (2,100 qrs.); potatoes, 3,636 ac. (17,400 tons); onions, 741 ac. (3,800 tons); forage, 8,575 ac.; cotton, 473 ac. (802 cwt.); *cumin, 2,036 ac. (7,400 cwt.). GOZO: wheat, 1,882 ac. (4,800 qrs.); barley, 2,032 ac. (5,600 qrs.); beans and peas, 647 ac. (1,400 qrs.); forage, 2,916 ac.; cotton, 424 ac. (895 cwt.).

Live Stock.—Av. 1908–12: horses, 3,460; mules, 3,080; asses, 3,420. Total, horses, mules, and asses, 9,960. Horned cattle, 6,640; sheep, 16,600; goats, 18,920; pigs, 4,520.

Railways.—Government: length of line open, 8 miles; av. receipts (1907–8–1911–12), £7,133 (1911–12, £6,712); av. expenditure, £6,305 (1911–12, £6,355), exclusive of cost of renewals averaging £1,321.

SHIPPING

Av. of five years.	TOTAL NET TONNAGE ENTERED AND CLEARED				
	1,000 tons.	H. Y.	1,000 tons.	British (av.) 1,000 tons.	% of total.
1897–1901	7,026	1897	7,244	4,985	70.9
1901–6	7,389	1904	7,967	5,054	68.3
1907–12	8,008	1910	8,667	4,680	58.5*

* Of the remaining nationalities German vessels averaged 16.5%, Austrian 10.3%, Italian 7.8%, and French 1.4%.

Average net tonnage on register, 4,093.

IMPORTS AND EXPORTS

(Until March 31, 1910, particulars respecting imports and exports were confined to *dutiable* articles actually landed on the island, and to re-exports of these articles.)

TRADE WITH PRINCIPAL COUNTRIES (Av. 1910–11–1912–13)

IMPORTS*			EXPORTS†		
	£1,000.	% of total.		£1,000.	% of total.
United Kingdom	1,088.0	42.77	United Kingdom	84.5	8.61
British possessions	72.3	2.83	British possessions	27.5	2.80
Total Empire	1,160.3	45.6	Total Empire	112.0	11.41
Foreign countries:			Foreign countries:		
Russia	275.7	10.83	Egypt	123.0	12.53
Italy	217.7	8.56	Italy	69.2	7.0
Turkey	132.5	5.2	Austria-Hungary	65.3	6.65
Total for. countries ‡	1,384	54.4	Total for. countries ‡	869.3	88.59
Total imports	2,544.0	100.0	Total exports	981.3	100.0

* Country of origin.

† Country of ultimate destination.

‡ Including ships' stores.

Chief Imports.—Av. 1910–12 (£1,000): coal, coke, and patent fuel, 357; wheat, 325; textiles, fabrics, and yarns, 182; bullion and specie, 157; cattle foods, 131; animals, living, 109; oils of all kinds, 101; sugar, 80; wine, 77; metals and manufactures, 75; flour and semolina, 71; fruit, 67.

Chief Exports.— (£1,000): coal and coke, 366; bullion and specie, 208; potatoes, 99; other exports, 253. Total, 926. Produce and manufactures of Malta, 240; other countries, 686.

CIVIL POPULATION. MALTA AND GOZO

	Males. 1,000.	Females. 1,000.	Total. 1,000.	Inc. % in intercensal period.	No. of males per 1,000 females.
1881	73.4	76.3	149.7	5.65	962
1891	81.3	83.7	165.0	10.18	972
1901	92.0	92.7	184.7	11.93	992
1911	105.6	106.0	211.6	14.52	996

The total population in 1911 was subdivided thus:

Malta.—Civil, 94,458 m., 94,411 f., total 188,869; garrison, 7,653 m., 1,363 f., total 9,016; Royal Navy, 7,569 m., 6 f., total 7,575; merchant shipping, 377 m., 2 f., total 379. Grand total, 110,057 m., 95,782 f.; total inhab. 205,839.

Gozo.—Civil, 11,143 m., 11,552 f., total 22,695.

Urban and suburban (civil) population, 124,756; rural population, 86,808. Total population per square mile, 1,953 (civil population, 1808.2).

REVENUE AND EXPENDITURE

Av. of five years.	REVENUE			EXPENDITURE		
	£1,000.	H.Y.	£1,000.	£1,000.	H.Y.	£1,000.
1897-1901	350.6	1901	385.7	355.0	1901	394.0
1902-6	472.0	1906	513.6 *	447.0	1905	480.5
1907-11	444.2 †	1908	457.5	458.6	1911	467.8

* Including £61,300 transferred to Maltese revenue from special funds.

† Customs £248,600, or 55.98 % of total.

Public debt (1912), £79,081.

CYPRUS

Area.—3,584 sq.m., i.e. 2.95 % of area of United Kingdom.

Agriculture.—Estimated acreage of cultivated land, 1,873 sq.m. (1,200,000 acres). Estimated acreage of uncultivated land, 1,709 sq.m. (1,093,760 acres), of which 703 sq.m. (450,000 acres) is forest land and 500 sq.m. (320,000 acres) susceptible of cultivation.

Produce.—Av. of five years, 1907-11, in thousands: wheat, 2,241 bush. (1911-12, 2,219); barley, 2,396 bush. (1911-12, 2,143); oats, 408 bush. (1911-12, 479); vetches, 165 bush. (1911-12, 219); cotton, 2,268 lb. (1911-12, 3,455); sesame, 688 lb. (1911-12, 1,009); olives, 7.18 tons (1911-12, 13.34); grapes, 30.65 tons (1911-12, 25.64); carobs, 44.55 tons (1911-12, 58.5); pomegranates, 4.06 tons (1911-12, 4.155).

Stock.—Av. 1907-11, in thousands: horses, mules, and donkeys, 67.0 (1911-12, 69.8); horned cattle, 59.7 (1911-12, 60.35); sheep (one year old and upwards), 286.5 (1911-12, 259.6); goats, 266.7 (1911-12, 252.1); camels, 1.156 (1911-12, 0.972).

Minerals.—Exports of asbestos average (1907-11) £2,265 (1912, £6,264), and of gypsum, £8,075 (1912, £2,812).

Railways.—Length of line open for traffic, 61. Cost of construction, £127,500. Av. passenger receipts, 1907-11, £6,640 (1911-12, £6,346). Goods receipts, £5,000 (1911-12, £5,006). Av. total receipts, £11,640 (1911-12, £11,352). Av. expenditure, 1907-11, £12,640 (1911-12, £11,663).

Shipping.—Av. tonnage entered and cleared, 1897–1901, 571,000 (*H.Y.* 1897, 698,000); 1902–6, 761,000 (*H.Y.* 1906, 897,000); 1907–11, 817,000, sailing vessels, 76,000, steam vessels, 741,000 (*H.Y.* 1908, 956,000).

Nationality of Shipping.—Av. of five years, 1907–11, in 1,000 tons: British, 155 (18.97 % of total); 1911, 114. Austrian, 193 (23.62 %); 1911, 210.4. Greek, 134 (16.40 %); 1911, 139.6. French, 122 (14.94 %); 1911, 128.7. Italian, 105.5 (12.91 %); 1911, 80.6. Other countries, 107.5 (13.16 %); 1911, 85.2. Total, 817; 1911, 758.5.

Chief Ports.—Av. tonnage entered and cleared, 1907–11, in thousands: Larnaca, 436 (1911, 391); Limassol, 270 (1911, 272); Famagusta, 81 (1911, 67.3).

IMPORTS AND EXPORTS

<i>Av. of years.</i>	IMPORTS			EXPORTS		
	£1,000.	<i>H.Y.</i>	£1,000.	£1,000.	<i>H.Y.</i>	£1,000.
1897–1901	357	1901	452	346	1901	389
1902–06	475	1906	603	425	1904	488
1907–11	630	1907	703	633	1911	703

Principal Articles.—Imports and exports, av. 1907–11, in £1,000. Imports: cotton manufactures, 85.4 (1911, 98); specie, 67.0 (1911, 88); flour and meal, 35.4 (1911, 62); woollen manufactures, 29.0 (1911, 26); timber, 25.0 (1911, 15); sugar, 23 (1911, 23); military stores, 21.0 (1911, 16); tobacco (unmanufactured), 20.0 (1911, 19). Exports: carobs (locust beans), 165 (1911, 183); barley, 81.4 (1911, 56); specie, 76.6 (1911, 76); fruit, 45.6 (1911, 61); wine, 30.0 (1911, 54); silk cocoons, 24.4 (1911, 28); cotton, raw, 20.0 (1911, 23); live stock, oxen, 19.4 (1911, 45).

TRADE WITH PRINCIPAL COUNTRIES *

(Av. of five years, 1907–11)

IMPORTS			EXPORTS		
	£1,000.	% of total.		£1,000.	% of total.
United Kingdom	151.9	24.1	United Kingdom	159.2	25.1
Total Brit. Emp.	156.7	24.8	Total Brit. Emp.	162.1	25.5
Foreign countries:			Foreign countries:		
Egypt	118.0	18.7	Egypt	236.3	37.4
Turkey	111.0	17.6	France	77.4	12.2
Austria-Hungary	69.2	11.0	Turkey	73.8	11.6
Italy	49.0	7.6	Austria-Hungary	22.3	3.5
France	42.2	6.7	Greece	17.4	2.7
Other foreign co.	84.5	13.6	Other foreign co.	43.7	7.1
Total foreign co.	473.9	75.2	Total foreign co.	470.9	74.5
Total	630.6	100.0	Total	633.0	100.0

* Imports credited to countries from which they were received directly; exports to countries to which they were exported.

POPULATION (CIVIL)

	<i>Males.</i>	<i>Females.</i>	<i>Total.</i>	<i>Inc. %.</i>	<i>No. of males per 1,000 females.</i>
	1,000.	1,000.			
1881	94.5	91.1	185,630	—	1,037
1891	106.8	102.4	209,286	12.74	1,042
1901	121.0	115.9	237,022	13.25	1,043
1911	139.2	134.7	273,964	15.60	1,034

Population according to Districts (in thousands).—Nicosia, 81·5 (population per sq.m., 78·36); Larnaka, 29·7 (81·47); Limassol, 46·1 (85·02); Famagusta, 58·5 (71·64); Paphos, 38·5 (67·1); Kyrenia, 19·7 (80·3).

Religions, 1911 (in thousands).—Greek and Orthodox Church, 214·5 (78·24 % of total); Muhamamadan, 56·4 (20·59 %); Maronite, 1·0; Roman Catholic, 0·8; Gregorian, 0·55; Church of England, 0·39; Protestant, 0·12; Hebrew, 0·19.

Revenue and Expenditure.—Revenue: Av. 1897–1901, £203,000 (*H.Y.* 1900, £215,300); av. 1902–6, £224,000 (*H.Y.* 1906, £286,900)*; av. 1907–11, £306,300 (1911, £319,500). * Contribution from Imperial Government, £28,000 (1911, £50,000). Total, £354,300 (1911–12, £369,572). Expenditure: Av. 1897–1901, £134,000 (*H.Y.* 1901, £135,800); av. 1902–6, £155,000 (*H.Y.* 1906, £182,000); av. 1907–11, £237,000 (*H.Y.* 1910, £251,500). Tribute to Turkey, £92,800. Total, £329,800 (1911–12, £328,055). In addition to the cash payment Turkey is entitled on demand to 4,166,220 oke of salt (approximately 5,200 tons).

Public debt.—Av. 1907–11, £287,000; 1912, £269,200.

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NOTE.—Certain general terms which are used as headings in this index, but not, as a rule, in others of the series, refer only to the British Isles.

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